Neolithic Spaces

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Chapter 10

Fortuitous Interventions: Geomorphological and Artefactual Investigations on Neolithic Features Exposed at Two Gravel Quarries

Mike Seager Thomas

This chapter deals with our detailed investigation of archaeological features exposed during gravel quarrying at two Neolithic enclosures, which we came upon during the course of the Mass Survey: Cava Petrilli (J4), on the western edge of the plain, and Canale Gavitella (J96) in the south (Figs 10.1 and 10.15). Visible in the two quarry faces were sections through the sites' main enclosure ditches, which we had expected to see only in aerial photos, along with other ditch- and pit-like features; and, sticking out of some of these, a treasure trove of stratified cultural material. While it was always our intention to plot some sites on the ground and to consider any artefactual material visible in the plough soil (see Chapter 6), we did not plan to conduct traditional archaeology on the Plain. However, this discovery of exposed features in the quarry sites provided us with a conventional archaeological imperative and a traditional archaeological opportunity, through which we were able to distinguish different types and dates of feature, some visible in the aerial photos but many not, and contextualise them in terms of each other and the activities that took place in their vicinity. The implications of this for our understanding of the Bradford Archive of aerial photos, our primary resource, the nature of the enclosures it revealed, and the wider Neolithic cultural landscape of which these formed a part is enormous.

METHODOLOGY

Our starting point in the study of the quarry sites was the same as for the Mass Survey (Chapter 6). The aerial photos were plotted on the IGM 1:25000 map and then located on the ground using handheld GPSs and conventional 'walkover' survey techniques. Thereafter our method developed depending on the visibility and accessibility of the features identified. At both sites the features exposed in the quarry faces were measured, characterised in terms of shape, photographed and/or drawn and located spatially using the GPSs. This

enabled us to correlate the exposed features with those visible on the aerial photos and to characterise them typologically. We then looked more closely at the sediments filling them. By comparing and contrasting these both with the natural geology through which the features they filled had been cut and with each other, macroscopically and using Optically Stimulated Luminescence (hereafter OSL) (Appendix 10.2) and Soil Micromorphology (Appendix 10.1), we were able to build up a picture of the features' sedimentological history and the varying contributions to this of different types of human activity (structural, agricultural, artefactual etc.). We also scoured the features and the ground below them for pottery, and, at Cava Petrilli, took samples of animal bone for radiocarbon dating and of sediments for dating using OSL.

Fig. 10.1 Overview of Cava Petrilli quarry in 2004, from the northwest, showing Neolithic feature F1 (with human figures). F2 is to the left, round the corner of the right-angular baulk

CAVA PETRILLI (J4)

Seven and a half kilometres north of Lucera, the Neolithic enclosure of Cava Petrilli lies on gently sloping ground just downslope of the highest point of a ridge running east-west between the Torrente Triolo and a smaller watercourse comprising Canale Bonifica, il Canaletto and Canale Pontesano (Figs 10.2 and 10.4). There are open views to the north and to the southeast. The extant RAF aerial photo (one only) shows a single-ditched, egg-shaped enclosure, in the fat end of which are visible at least four poorly defined C-ditches, two of which appear to open to the northwest (Fig. 10.5, left). To the east, a 'gap' in the main enclosure ditch lies within or is straddled by a smaller sub-circular enclosure and there is a curvilinear ditch to the west. The picture is complicated, however, by traces visible in photos on Google Earth of a possible additional enclosure ditch to the northwest of, and outside that visible in the RAF photo, and a group of clearly defined C-ditches along the ridge to the west. In addition several features not visible from the air, were visible in section on site. Finally, the sedimentology of the main enclosure ditch visible in the aerial photo suggests that this had been surrounded on the inside by a bank, comprising material thrown-up when the ditch was dug.

By the time of our first visit to the site in 2004, quarrying had removed the underlying gravels to a depth of between three and four metres, and destroyed most of the features

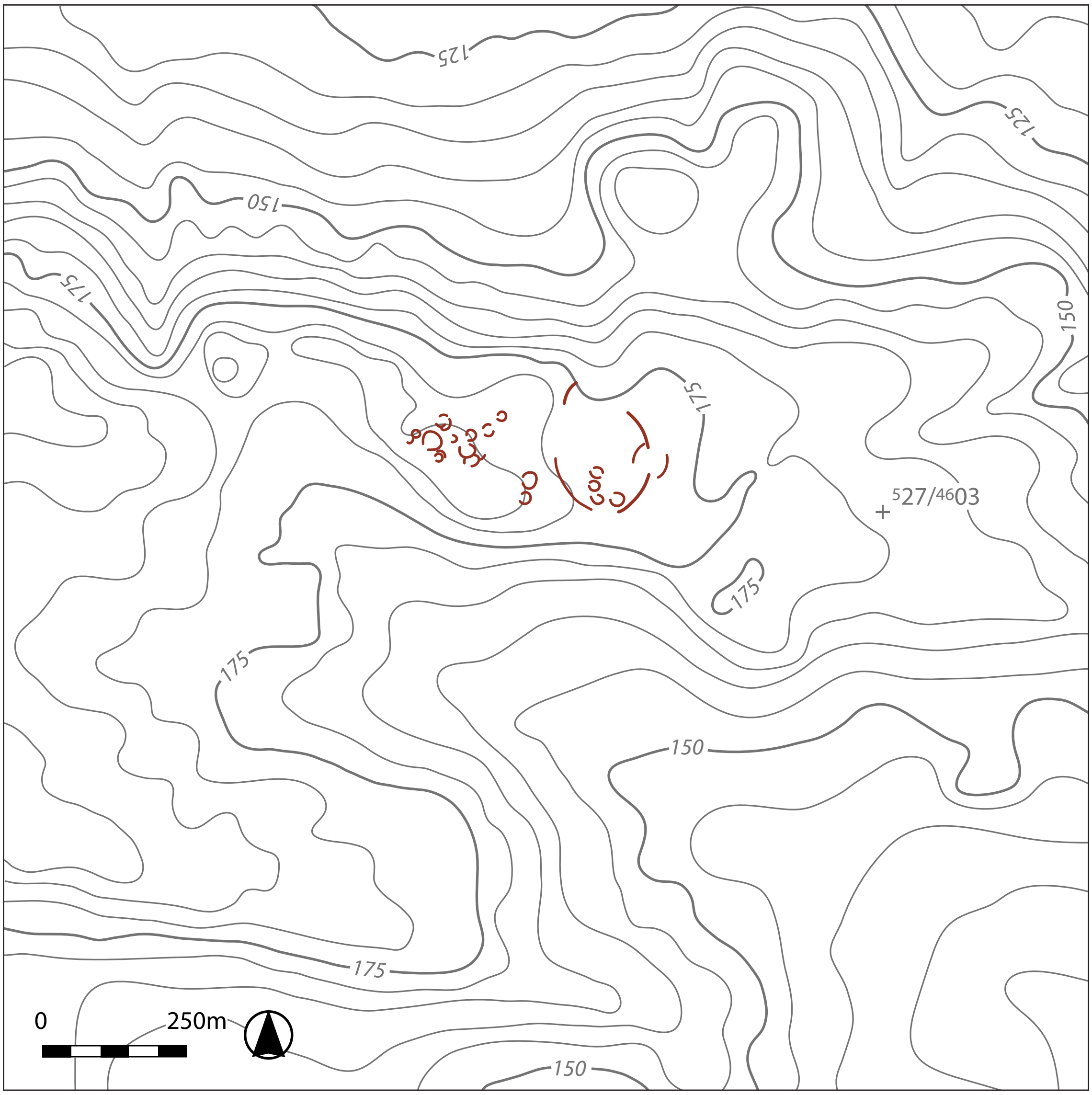

Fig. 10.2 Cava Petrilli (J4) in its landscape setting. This map shows both features visible in the Bradford airphoto, taken before their destruction by quarrying, and additional features to west of main enclosure, plotted from photos on Google Earth (accessed on 14th August, 2010 and 21st March, 2015)

visible in the aerial photo. To the southeast, a right-angular baulk just projected into the area of the enclosure visible in the aerial photo, whilst the quarry's westernmost face and two narrow baulks to the east, lay just outside of it (Figs 10.1 and 10.5, right). In places these baulks stood to the height of the pre-quarry landsurface; in places they had been stripped of up to a metre in depth of top- and subsoil. Cut features were visible in all of them and Neolithic pottery presumably derived from material stripped from the site lay all around (Fig. 10.3). The quarry at this time appeared to have been abandoned. Between September 2006, however, and our last visit to the site in 2008, renewed quarrying had cut back the right-angular baulk by about 35m (Figure 10.24).

In the right-angular baulk, sections F1 and F2 corresponded closely with the surviving ends of the unquarried main enclosure ditch as plotted by us on the IGM 1:25000 map from the original aerial photo. Both these feature sections, along with the greater part of the surviving ditch between them, were destroyed when quarrying at the site recommenced. We also identified a *probable* section through the enclosure ditch, in an overgrown baulk in the northwest corner of the quarry (F8 – not illustrated). The other surviving features all lay outside the main enclosure ditch visible in the aerial photo. These include part of the

Fig. 10.3 Unstratified pottery from Cava Petrilli. Sherd 5 is from the vicinity of F8

small sub-circular enclosure, F3, a linear ditch (the possible outer enclosure ditch referred to above) visible in the north-facing section of the right-angular baulk both before (F5) and after the latter was cut back (F9 – not illustrated), F4/10 (not illustrated), visible in

Fig. 10.4 Cava Petrilli from the southwest with the Gargano behind. The Neolithic site, which is marked by a line of dark scrub, is located on the ridge just to the left of centre

the east-facing baulk of the quarry before and after it was cut back, which we consider part of the curvilinear ditch visible in the aerial photo, and ditch F6/7, visible on both sides of the easternmost of the two central baulks (Fig. 10.3, right). All these features contain or contained Neolithic pottery, and – except for F6/7 – abundant other culturally generated material.

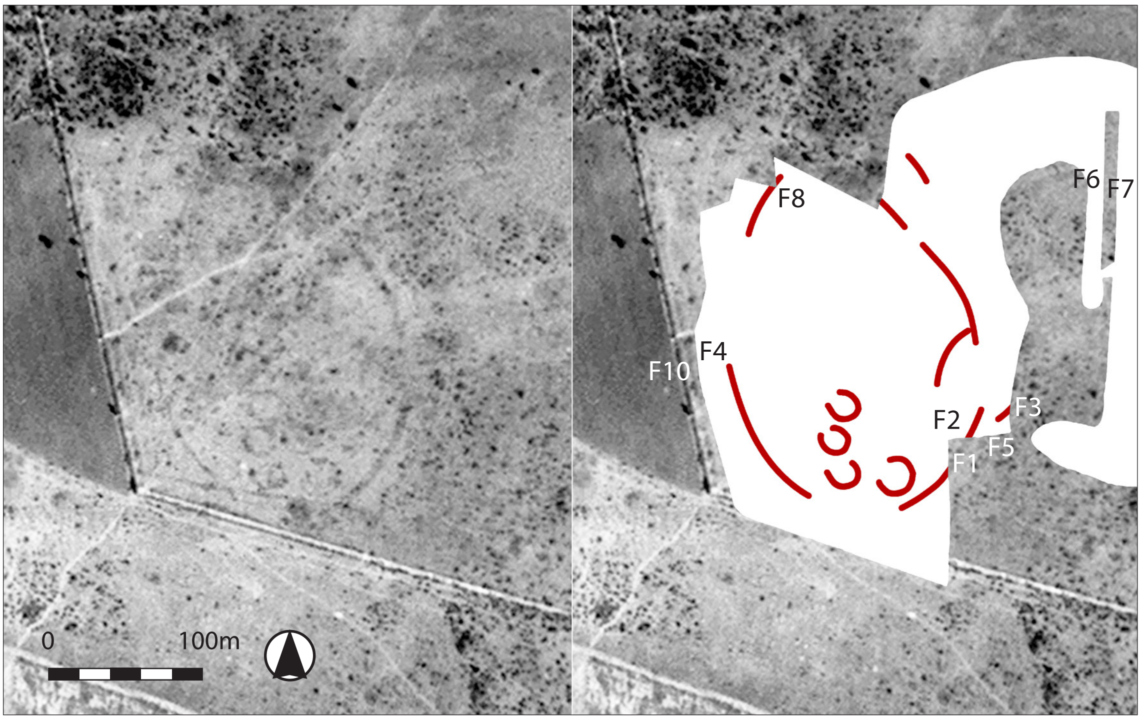

Fig. 10.5 Air photo of Cava Petrilli (J4), showing, left, the site as it was on the 20th September 1943, and, right, the location of the gravel quarry and the position of the archaeological features exposed in it.
Photograph: Bradford Archive

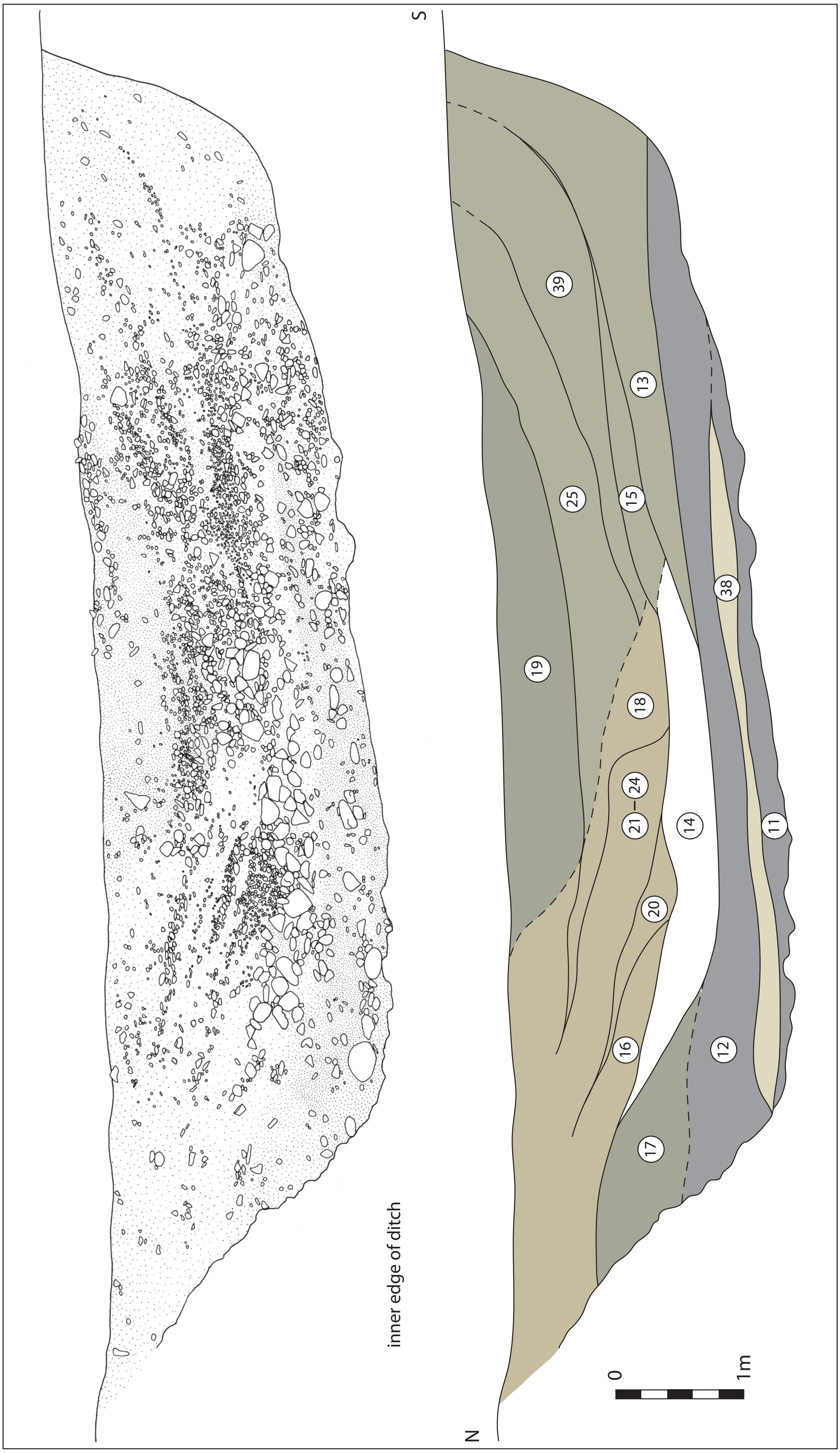

Fig. 10.6 Literal and interpretative drawings of the oblique, west-facing section through the main enclosure ditch at Cava Petrilli (F1). For sediment descriptions see Table 10.1

Fig. 10.7 West-facing section through the main enclosure ditch at Cava Petrilli (F1)

The geology of the site

The site is located between the 175m and 180m contours. The sediments underlying it comprise weakly bedded, clast-supported, smooth sub-angular to well-rounded gravels with a patchily iron-rich quartz sand matrix. In places these incorporate a greater proportion of stones of one size rather than another, but overall they are poorly sorted in terms both of size and lithology. Given the site's high elevation, these coarse gravels must belong to the region's Pliocene inundation. For up to 2m below the present land surface they are cemented by creamy white lower *crosta*, a later calcrete widely present across the Plain. In addition, the former presence above this of both the middle and upper *crosta* is shown by its presence in several features (for a discussion of crosta on the Plain see Delano Smith 1987:12). All of the archaeological features discussed here had been cut through these layers/ deposits and many of their fills had been derived directly or indirectly from them.

Site features

The main enclosure ditch

The main enclosure comprised an egg-shaped ditch surrounded on the inside by a bank. At first sight the two principal sections through the ditch (F1 and F2) appeared different, so much so indeed that at first we believed them to belong to different features, but this difference is attributable to the angle at which the right-angular baulk cut it – 45° in the case of F1 and 80°, or slightly less, in the case of F2. The very oblique cut comprising section F1 gave the impression of a wide feature with gently sloping sides (Figs 10.6 and 10.7), when the ditch's true profile was closer to that seen in F2, which was both narrower and steeper-sided (Figs 10.8 and 10.9). Its dimensions placed it at the upper end of the size range for excavated Tavoliere Neolithic enclosure ditches. The bottom of the ditch in both sections sloped towards the interior of the site. The slow rate at which it was filled (see below), the absence in F2 of significant quantities of gravel or crosta eroded from its sides, the lack of

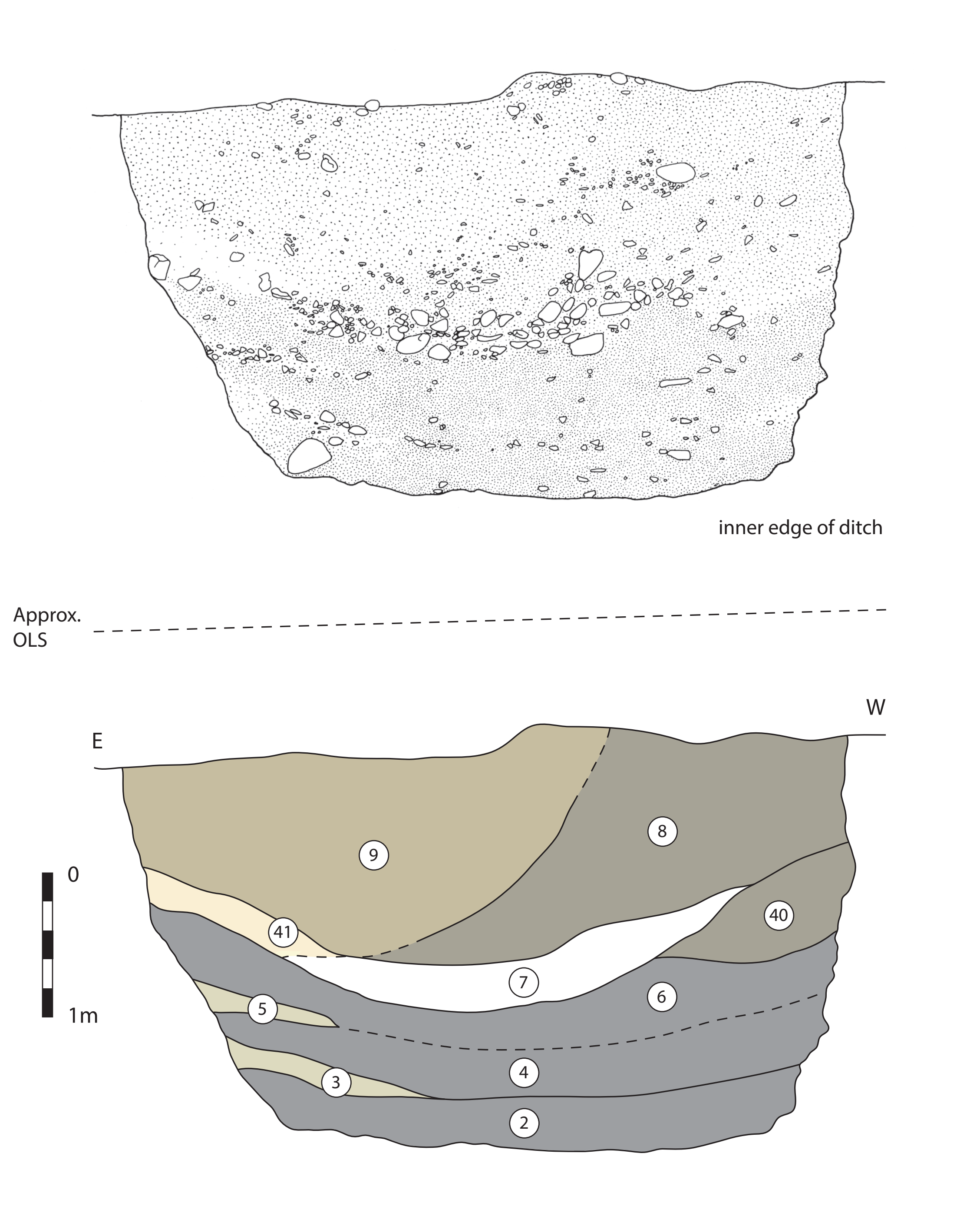

Fig. 10.8 Literal and interpretative drawings of the approximately right-angular north-facing section through the main enclosure ditch at Cava Petrilli (F2). For sediment descriptions see Table 10.1

evidence for re-cutting, the similar form of the two sections (when viewed from the same angle), and the prolonged survival of the modern quarry face, indicated by the weathering of limestone boulders projecting out of it, suggest that it survived more or less unaltered throughout the period during which the ditch was open.

The Neolithic fill sequence (Table 10.1) can be divided into two distinct phases, the first of long duration, when the ditch was an active boundary, surrounded on the inside by a bank, and domestic-type activities were taking place nearby, and probably in it, the second of short duration, when the ditch was deliberately filled-in with material derived from the bank. Fills were studied macroscopically and using OLS and micromorphology (the first phase only).

Fig. 10.9 North-facing section through the main enclosure ditch at Cava Petrilli (F2)

The first phase was represented primarily by a deposit of grey silt (Figs 10.7 and 10.9), in which there was a wealth of pottery, daub, struck chert, bone and charred material (Appendices 10.1 and 10.4). This silt varied in thickness between about 30cm in F1, and 1m in section F2. In both it comprised several layers. These were defined by horizontal laminae comprising mostly charred material, or mostly stony material, whose roughly horizontal fabric shows it to have fallen onto pre-existing, *consolidated* surfaces within the silt, and a variable ped-structure, which in two places in F2 indicated extended soil development (Table 10.1, lower). The stony material looked like fresh *crosta*-cemented gravel and is assumed to have eroded from the sides of the ditch. The silt however was utterly different from the sediments through which the ditch was cut and its origins must be sought elsewhere, in our view, either in the activities that generated the cultural material found in it or in a pre-existing deposit generated by such activity, such as a midden, which – since there was a bank located inside the ditch – must have been located *outside* of it. This picture of a series of fills deposited slowly from an anthropogenic source is greatly enhanced by the micromorphological analysis, which shows it to have been gently waterlain, to have been rich in ash and charred material derived from cereal processing and/or the burning of *Gramineae*-fed stock stabling waste,[1] to have contained human excreta, and to have been trampled, perhaps by stock corralled in the ditch (Appendix 10.1). Animal bone from this grey silt produced middle to late 6th millennium BC radiocarbon dates (Appendix 10.3) while sediments produced late 7th to early 6th millennium BC OSL dates, later than the dates yielded by the small sub-circular enclosure (Appendix 10.2). In the sediments deposited during this first phase, there was no evidence for *deliberate* dumping within the ditch.

The second phase was represented by a series of stony layers (Table 10.1, upper). These too contained Neolithic cultural material, but in much smaller quantities (Appendices 10.1 and 10.4). The earliest comprised mostly coarse vacuous gravel. The level at which this occurred in both sections rules out a source in the sides of the ditch, since both at these levels and above, adjacent natural gravels comprise smaller stones. Vacuity moreover would not be expected of eroded material. This was a deliberate fill, which, since it was both

Main enclosure ditch

	F1		F2		
Fill group	**Layer**	**Fill description**	**Layer**	**Fill description**	**Fill mechanism**
TOP					
upper	19	Grey buff sandy silt with crosta granules, sparse poorly sorted, matrix supported water-rolled pebbles and rare crosta. Sharp interface with 18, 23 & 25.	9	As 19 (grading down into buff). Sharp interface with 8.	deliberate backfill
	25	Moderately well sorted, clast and, patchily, matrix supported water-rolled pebbles. Matrix as 19. Diffuse interface with 18. Sharp to diffuse interface with 39.	8	Grey buff sandy silt with crosta granules, sparse to common, irregularly orientated, poorly sorted, matrix and, patchily clast supported water-rolled pebbles and rare crosta. Sharp interface with 6 & 7.	
	18	Moderately well sorted, clast supported water-rolled pebbles to large cobbles with a roughly horizontal fabric. Partially vacuous. Extant matrix: buff sandy silt with crosta granules. Diffuse interfaces with 14 & 24. Part of 23. Sharp interface with 21.			
	23	Poorly sorted, clast supported water-rolled pebbles lying on or parallel to 21. Matrix as 18. Sharp interface with 21. Part of 18.			
	39	Grey buff sandy silt with crosta granules and rare, poorly sorted, matrix supported, water-rolled pebbles. Sharp interface with 15.			
	21	Buff sandy silt with crosta granules and poorly sorted, sparse water-rolled pebbles. Sharp interface with 14 & 24.			
	24	Poorly sorted, clast supported water-rolled pebbles. Matrix as 21. Sharp interface with 22.			
	22	As 21. Sharp interface with 20.			
	20	Poorly sorted, clast supported water-rolled pebbles with matrix as 21, grading down and to the south into vacuous, moderately well sorted medium pebbles. Sharp interface with 14 & 16.			
	16	As 21 except moderate water rolled pebbles at northernmost interface with 14). Sharp interface with 14.			
	15	Poorly sorted, clast supported water-rolled pebbles to large cobbles with buff sandy silt matrix containing crosta granules. Grades into 14. Diffuse interface with 13.			
	14	Poorly sorted, clast supported, water-rolled pebbles to small boulders and sparse upper and middle crosta, vacuous at the top, with a buff sandy silt matrix containing crosta granules below. Sharp interface with 12 & 13.	7	Poorly sorted, clast supported water-rolled pebbles to very small boulders and sparse upper and middle crosta, vacuous at the top with a patchy grey silt and buff sandy silt matrix containing crosta granules below. East end crosta-rich. Sharp to diffuse interface with 6.	
	13	Grey buff sandy silt with crosta granules and poorly sorted, sparse water-rolled pebbles. Sharp interface with 12.			

Table 10.1 Fills in the main enclosure ditch at Cava Petrilli (F1 and F2)

lower	12	Mid grey silt containing poorly sorted, rare to sparse water-rolled pebbles to cobbles and rare crosta with very roughly horizontal fabric. Sharp interface with 38.	6	Mid grey silt containing poorly sorted, rare, matrix-supported water-rolled pebbles and crosta with roughly horizontal fabric. Distinct thin horizon with blocky ped structure visible immediately below 7, prior to cleaning. Sharp interface with 5.	silting/ eroded natural
	38	Poorly sorted, clast supported water-rolled pebbles to large cobbles and rare crosta with a roughly horizontal fabric and a patchy mid grey silt and buff sandy silt matrix. Diffuse (discontinuous) interface with 11.	5	Poorly sorted, clast supported middle crosta and water-rolled pebbles to cobbles in a buff sandy silt matrix containing crosta granules. Sharp interface with 4.	
			4	Mid grey silt (as 6). Mostly columnar ped structure, visible prior to cleaning. Horizontal divisions indicated by thin horizon with blocky ped structure, visible prior to cleaning, and thin (<1mm) laminae comprising charred material. Sharp interface with 3.	
			3	Poorly sorted, clast supported water-rolled pebbles and upper and middle crosta in a buff sandy silt matrix containing crosta granules. Extends across the section as a single line of stones with a roughly horizontal fabric. Sharp interface with layer 2.	
	11	Mid to dark grey brown silt with abundant charred material.	2	Mid grey silt (as 6). Single, small smooth sub angular boulder.	
BOTTOM					

Table 10.1 cont. Fills in the main enclosure ditch (F1 and F2)

thicker and, in section F2, higher on the inner side of the ditch, we believe to have been dumped from within the ditch. The same is true of the overlying material: in section F1, a series of sloping layers comprising finer, alternately clast-supported and matrix-supported gravels, and in F2, a massive layer of clean matrix-supported gravel.

(Slope processes active within these stony layers when they were deposited resulted in some internal sorting, most noticeably in F1, with the larger stones from individual deposits concentrating downslope to form an inhomogeneous mass at the centre of the feature. For this reason the context divisions shown in the interpretative drawings should be taken as just that: interpretative) (Figs 10.6 and 10.8).

There are two obvious explanations for these deposits: fresh pit- or ditch-digging (see Canale Gavitella, J96, below), or deliberate backfilling from a pre-existing internal bank or dump, up-cast when the ditch was first dug. The first of these can be ruled out as the earliest gravels lay directly on the grey silt. A freshly dug feature would, if cut through undisturbed natural sediments, yield topsoil, *crosta*, fine and coarse gravels – in that order; whereas a pre-existing bank or dump would yield the same sediments in the order in which they occur in the ditch. This latter view is consistent with the data provided by OSL, which show these sediments to have been older (literally, fresher) than the underlying silts, but younger (less fresh) than previously unexposed natural gravels (Appendix 10.2). The most likely explanation for the fills of the second phase therefore is that a pre-existing bank located on the inside of the ditch was back-filled into it. This must have occurred quite quickly since there is little evidence for natural silting within them and none at all for soil development of the sort present in the lower silt.

In addition to the grey silt comprising the lowermost fills of the main enclosure ditch, evidence for activity outside the main enclosure comes from four smaller features: ditch F3, ditch F4/10, which was destroyed by renewed quarrying before we had a chance fully to record it, ditch F5/9 and ditch F6/7.

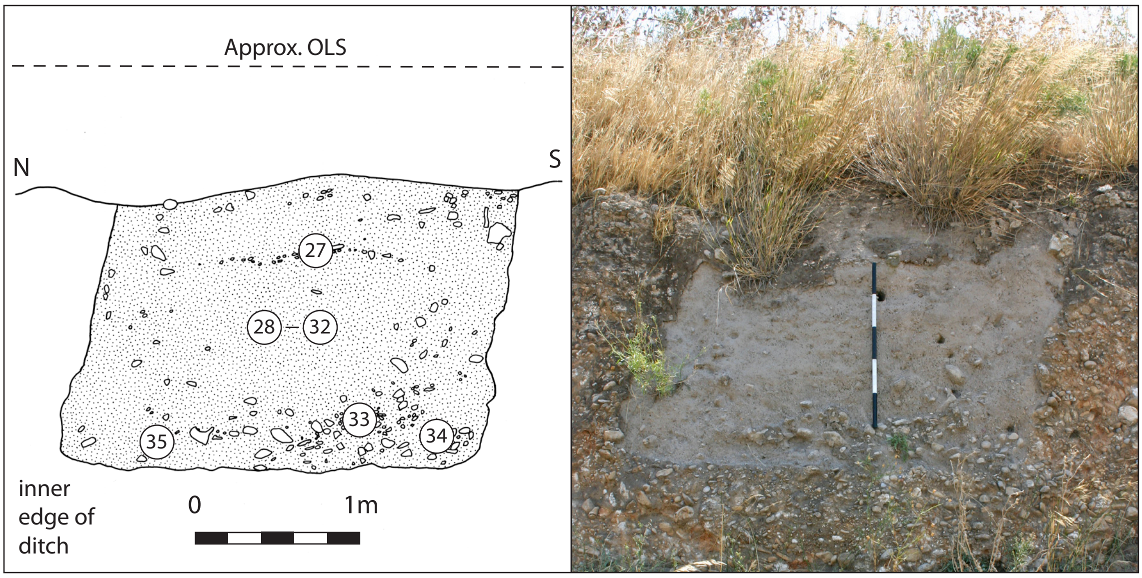

Fig. 10.10 West-facing section through the small enclosure ditch (F3)

The small sub-circular enclosure or nucleus

The best data come from F3, a square-cut feature located within a few metres of the main enclosure ditch (Fig. 10.10), which appears to correspond with the possible sub-circular enclosure or "nucleus" visible on the aerial photo. It had an array of techniques thrown at it similar to those applied to the sections through the enclosure ditch.

The sediments filling this ditch (Table 10.2) appear quite different from those filling the main enclosure ditch (Table 10.1) and, according to the OSL (Appendix 10.2) they are earlier than both the grey silt filling and the radiocarbon dated bone recovered from the latter. They fall into two groups. The lowermost are dump-like. Sloping down from the south or outside, they comprise mixed, partly clast-supported and partly matrix-supported stone amongst which the micromorphological analysis (Appendix 10.1) distinguished a range of

F3			
Fill group	**Layer**	**Fill description**	**Fill mechanism**
TOP			
upper	26	Sediment not described. Sharp interface with 27. No clear interface with 28.	silting
	27	Moderately well sorted, clast supported, flat, water-rolled medium pebbles with a roughly horizontal fabric. Mid grey sandy silt matrix. Visible to centre of section only. Sharp interface with 28.	
	28	Mid grey sandy silt. Sharp interface with 29. No visible interface with 30.	
	29	Horizontal mid grey sandy silt lamina with moderately well sorted, small granule sized gravel. Visible to centre of section only. Sharp interface with 30.	
	30	As 28 with rare water-rolled pebbles. Sharp interface with 31. No clear interface with 32.	
	31	As 29. Sharp interface with 32.	
	32	As 30 with rare to sparse, irregularly orientated water-rolled pebbles and cobbles. Sharp interfaces with 33 & 35.	
lower	33	Poorly sorted, clast supported water-rolled pebbles to cobbles and sparse middle crosta with sloping fabric. Mid grey sandy silt matrix with crosta granules. Diffuse interface with 9. Sharp interface with 35.	deliberate backfill
	34	Grey sandy silt with crosta granules, sparse to common, irregularly orientated, moderately well sorted, matrix and, patchily clast supported water-rolled pebbles. Diffuses into 35.	
	35	Grey sandy silt with crosta granules and rare water-rolled pebbles. Diffuses into 34.	
BOTTOM			

Table 10.2 Fills in ditch F3

cultural material similar in composition, albeit more comminuted, to that identified in the main enclosure ditch (F1/ 2). Above these they are sandier but otherwise similar to the grey silt filts of the latter, with clear hiatuses but no sloping dump lines.

The sedimentological environments and the fill mechanisms of the two features therefore were similar. Possibly therefore there was some functional continuity in the vicinity *through* the period when the two ditches were dug. On the other hand, at the time F3 was being filled activities that might have added sand to the mix such as feature digging, which were not reflected in the lower fills of the main enclosure ditch, were taking place. Could this reflect the digging of the ditch itself? If so it suggests the possibility, firstly, that the latter was dug over an extended period (equal to that it would take the earlier ditch to silt up), and, secondly, that one replaced the other.

The outer enclosure ditch

Visible high in the north face of the right-angular baulk, both before and after it was cut back by renewed quarrying, was a bag-shaped feature. The two widely separated sections through this feature, F5 (Fig. 10.11) and F9 (not illustrated), show it to have diverged slightly

Fig. 10.11 North-facing sections (F5) through the possible outer enclosure ditch (F5/ F9)

from the main enclosure ditch towards the south. Though smaller in section than the main enclosure ditch, its position, and hints on Google Earth and in section of an additional outer enclosure ditch to the northwest of the site, suggest to us that it too may form part of an outer enclosure ditch. That said it does not itself correspond with any features visible from the air.

F5 contained eight distinguishable fills. The earliest comprised partly clast-supported and partly matrix-supported stone, coarser than but similar to the lower fills of F3. The next was identical to the grey silt filling the main enclosure ditch. Then there were two stony layers, the first similar to its lowermost layer, the second level, of even thickness across the feature, and comprising mostly *crosta* with a pronounced horizontal fabric. (Above this latter, the section widened slightly). This was overlain by a thinner layer of grey silt, another stony layer, more grey silt and then a deposit with several clear tip lines but otherwise similar to the upper fill visible in section F2. Of these, both the grey silt and the upper layer yielded

Neolithic pottery. The lowermost fills of F9 (not illustrated) are more homogenous than those of F5, but otherwise the fill sequence within the two sections is similar.

In our view the conjunction between the feature's central stony layer – which looks like a trampled surface – and the widening of the section, indicates its partial re-cutting, and possibly redesignation. With this one exception, however, all of F5/9's sedimentological components are present in the main enclosure ditch or F3. Overall it shares the sedimentological environment of the other features, and may therefore have been open at the same time, a view consistent with the interpretation of it as an additional outer enclosure ditch, proposed above. If this is the case, the midden or cultural activities inferred above, outside the main enclosure ditch, may in fact have been located between the two ditches. The interleaving of sediments within it, however, alerts us to the possibility of activities in the vicinity not reflected in the other features and perhaps a different chronology. What these activities were we do not know but they certainly involved the clearing of stones into F5 and possibly the re-use of the upper part of the feature.

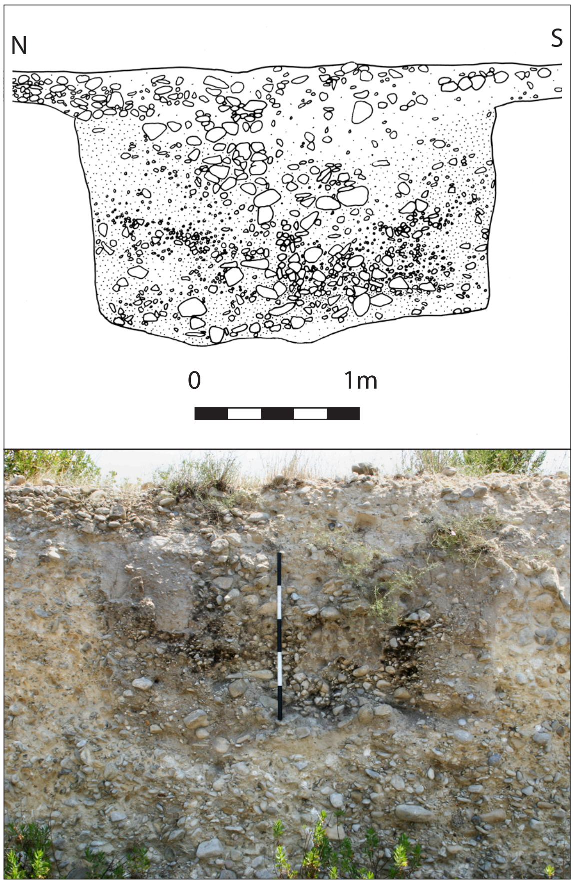

Fig. 10.12 West-facing section through ditch, F6

Other features

Ditch F4/10 lay just outside the main enclosure ditch, across the site from sections F1 and F2. It is almost certainly the curvilinear feature visible in the aerial photo. It was seen twice: first in a south-facing offset projecting out of the main east-facing baulk of the quarry (section F4 – not illustrated), where it was cut by two or more undated features, then, after the offset had been quarried away, in the main east-facing baulk about 20 metres away, where it or a feature very like it occurred by itself (F10 – not illustrated). In both sections it was about a metre and a half wide and it must formerly have been at least twice as deep. Its grey silt fill was identical to that recorded in the main enclosure ditch, on the other side of the site, and both it and the earlier of the two possible features with which it was associated contained identical types of pottery. Probably therefore the sedimentological environment close to the enclosure ditch on both sides of the site was similar.

Finally section F6 and F7 on opposite sides of the eastern-most of the two central baulks, are well outside the main enclosure. Owing to the irregular weathering of its stony fills we do not understand this feature well (Fig. 10.12). Neither section, however, contains the grey silt or abundant artefacts, and presumably therefore it had a very different sedimentological environment and/or history.

CANALE GAVITELLA (J96)

Canale Gavitella (J96) is located, along with three other sites, Canale Gavitella II (G15), Masseria del Capitano (J97) and Masseria del Capitano II (A130), on the upper edge of a river terrace above Marana la Pidocchiosa (Fig. 10.13). This configuration with several small sites spaced out along a minor watercourse is typical of the southern part of the survey zone. On the aerial photo the main enclosure ditch of Canale Gavitella is clearly visible, but there are hints, not acknowledged by Jones, of several other features that roughly correspond with those that we identified in the field (Fig.10.14, left). Jones classified it as a Class I site. Interpreting the ditches visible in the quarried section and part of the main enclosure, we have classified it as a small multiple.

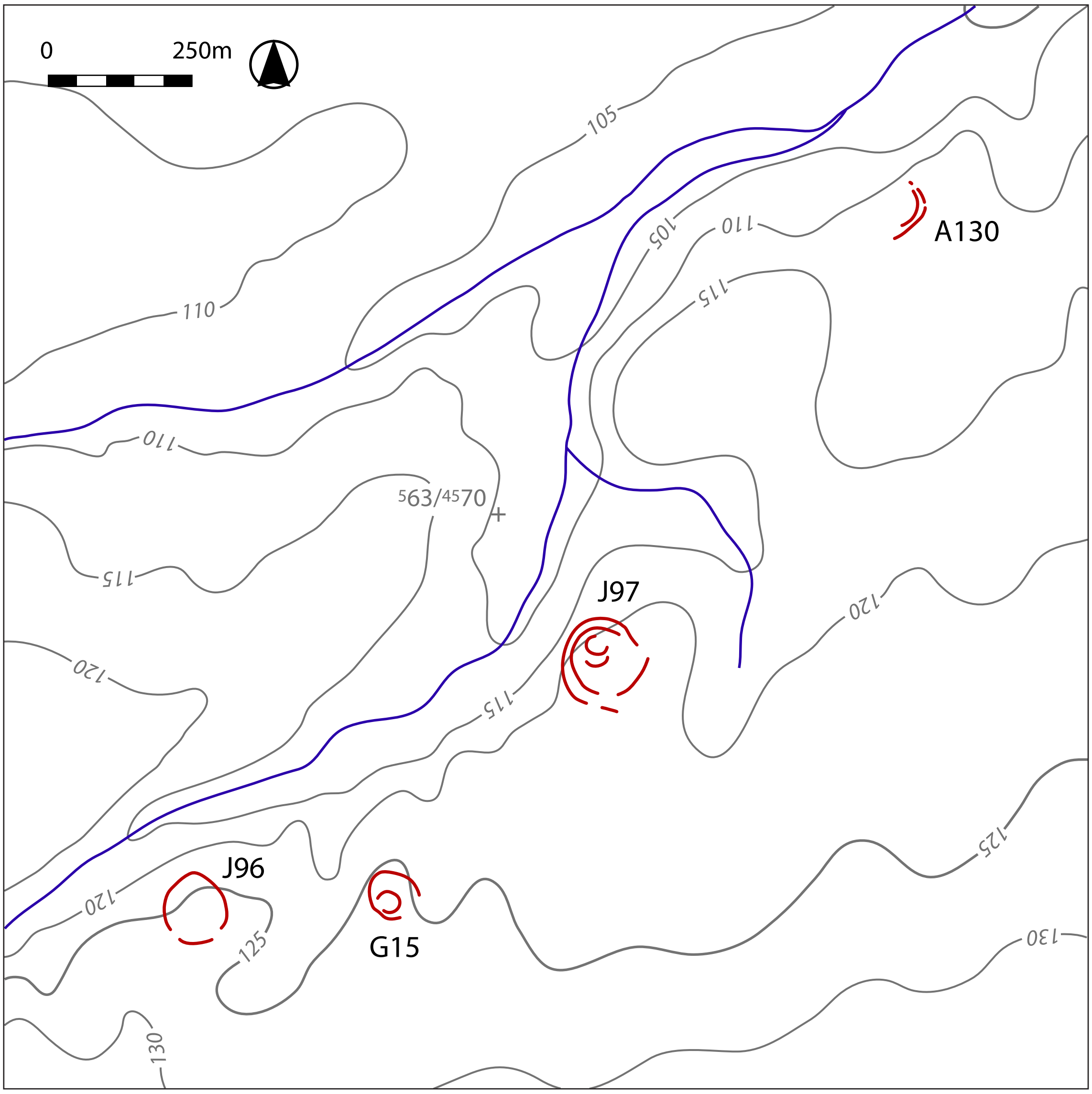

Fig. 10.13 Contour map showing Canale Gavitella (J96), Canale Gavitella II (G15), Masseria del Capitano (J97) and Masseria del Capitano II (A130) in their landscape setting

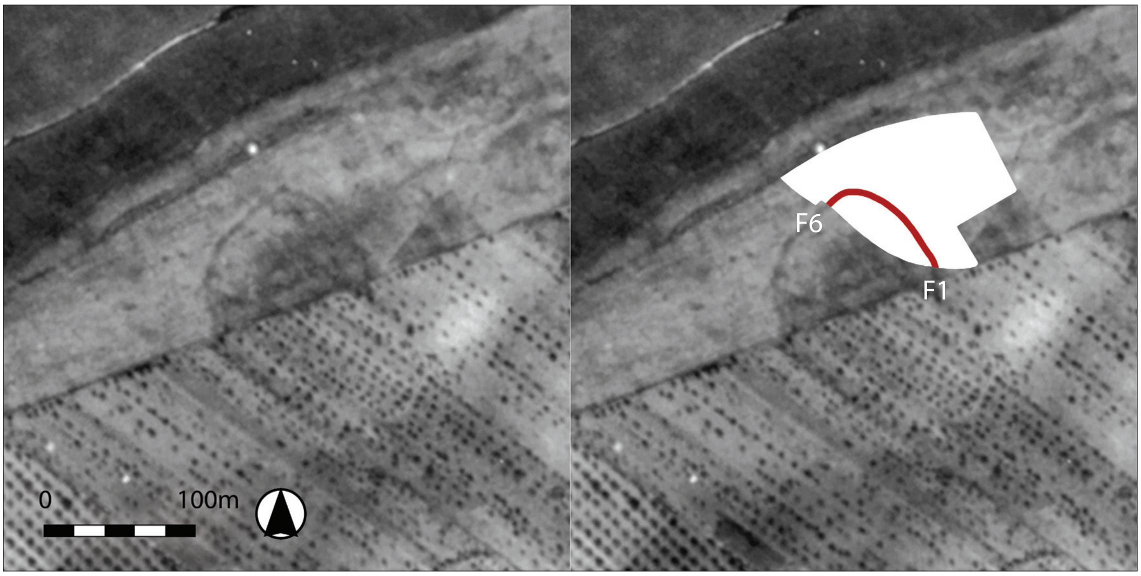

Fig. 10.14 Aerial photo of Canale Gavitella (J96), showing (left) the site as it was on the 29th April 1945, and (right) the location of the modern gravel quarry and the position of archaeological features exposed in it. *Photograph: Bradford Archive*

When we found it, Canale Gavitella was being actively quarried but by our final season the quarry had been abandoned. Quarrying has clipped off one end of the site up to a depth of about eight metres, providing us with a complete section across it (Figs 10.14, right, and 10.23). Owing to the depth of the quarry, however, we were unable to approach and physically sample the exposed features.

The features seen were all in the quarry's northeast-facing baulk (Fig.10.15). The two outermost, one square cut (F1) and one with a square to tapering profile (F6) (Figs 10.16 and 10.17), are on the line of the main enclosure ditch as plotted by us on the IGM 1:25000 map

Fig. 10.15 Canale Gavitella quarry (J96)

from the original airphoto and we assume that they belong to it. All the others are, or were inside it. They include two pairs of features each of which comprises a wide rectangular cut to the southeast and a narrow square one to the northwest (F3 and F8, and F5 and F7) (Figs 10.18–10.20) that we interpret as sequential interior enclosures, and two smaller features, one with a square-cut profile located just inside the main enclosure ditch (F2) (Fig. 10.21), and one with a U-shaped profile close to and inside of F5 (section F4 – not illustrated), which we think are probably pits. Where the quarry's baulks extend beyond the site's main enclosure ditch, no features were visible in the section.

Fig. 10.16 Northeast-facing section through the main enclosure ditch at Canale Gavitella (F1, to the south of the site). Scale 1m

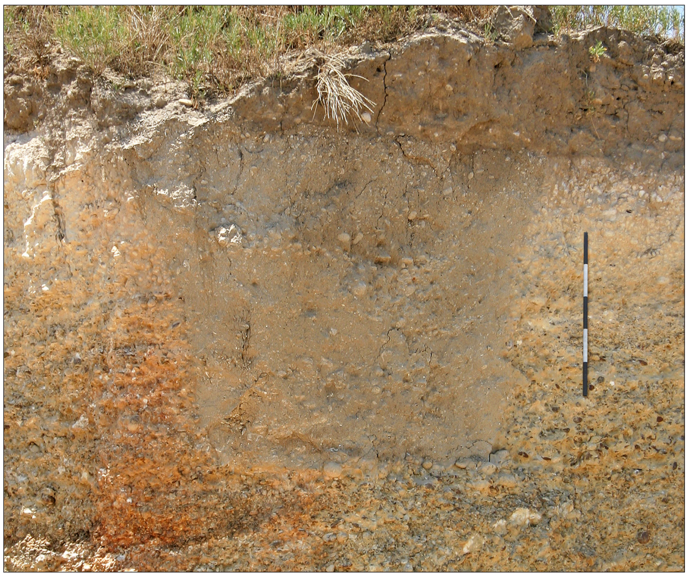

Fig. 10.17 Northeast-facing section through the main enclosure ditch at Canale Gavitella (F6, to the north of the site). Scale 1m

The geology of the site

The sediments underlying Canale Gavitella comprise cross-bedded river terrace gravels (Fig.10.15). They consist of clast supported, smooth, well-rounded gravels with a quartz-sand matrix, interleaved with lenses of cross-bedded sands, in once case filling a distinct palaeochannel.

The upper two and a half metres or so are cemented by *crosta*, with 20 to 30 centimetres of the middle *crosta* surviving at the very top of the baulk. At this point there is a modern discontinuity across the site, marked by asymmetrical plough marks at the top of several features and a layer of grey brown sandy silt plough soil, ranging in thickness between about

Fig. 10.18 Northeast-facing section through Canale Gavitella interior enclosure ditches F3 and F8. Scale 1m

50 centimetres between F2 and F3 – approximately the highest point of the site visible in the section – and one metre above F6 – the lowest point of the site visible in the section. The survival of the middle *crosta* shows Canale Gavitella to have been truncated less than Cava Petrilli.

Fig. 10.19 Northeast-facing section through Canale Gavitella interior enclosure ditch F5. Scale 1m

Site features

Many key elements of Canale Gavitella's site features are similar to Cava Petrilli's – in particular the large size and the square cuts of the ditches, the multiple stony fills faintly visible in the sections through the enclosure ditch (Figs 10.16 and 10.17), the fresh appearance of these (suggestive of rapid backfilling), and the grey silt fill of the interior enclosures and pits (Figs 10.18–10.21), all of which are very different from the sediments underlying the site. There are however marked differences as well. In both sections the main enclosure ditch, for example, is stone-filled from the base up, and there is no evidence for a particular tip direction indicative of a source of fill material on one side rather than another, i.e. there was no demonstrable bank; whilst in F3 and F5, the grey silt has clear

Fig. 10.20 Northeast-facing section through Canale Gavitella interior enclosure ditch F7. Scale 1m

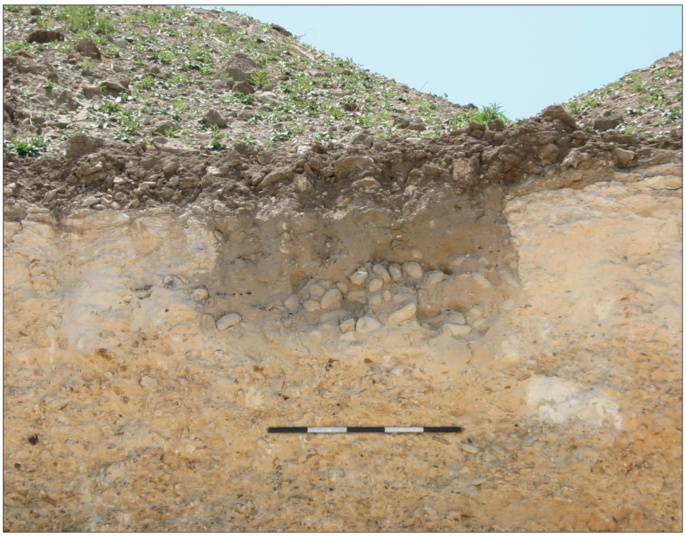

Fig. 10.21 Northeast-facing section through Canale Gavitella interior pit F2. Scale 1m

tip lines indicating that it was a deliberate fill that came in from *different directions*. We also found very little pottery – a few sherds below ditch F3 (Fig. 10.22) and a small surface concentration outside and to the west of the main enclosure ditch only. Even the small pit, F2 (Fig.10.21), is distinct. The clast-supported stones comprising its lower fill are both large (much larger than any in the adjacent natural gravels) and well sorted, suggesting the possibility that they were curated. None of Canale Gavitella's features therefore can be explained in the same terms as Cava Petrilli's. It can be suggested that there was some kind of Neolithic feature template in use in the region as a whole, but it would be quite wrong to suggest that the overall trajectory of features and feature use was the same on all sites.

Since we could not get close to them, however, and could not study their sedimentology in detail, we were less interested in them as individual features than in their configuration as a group.

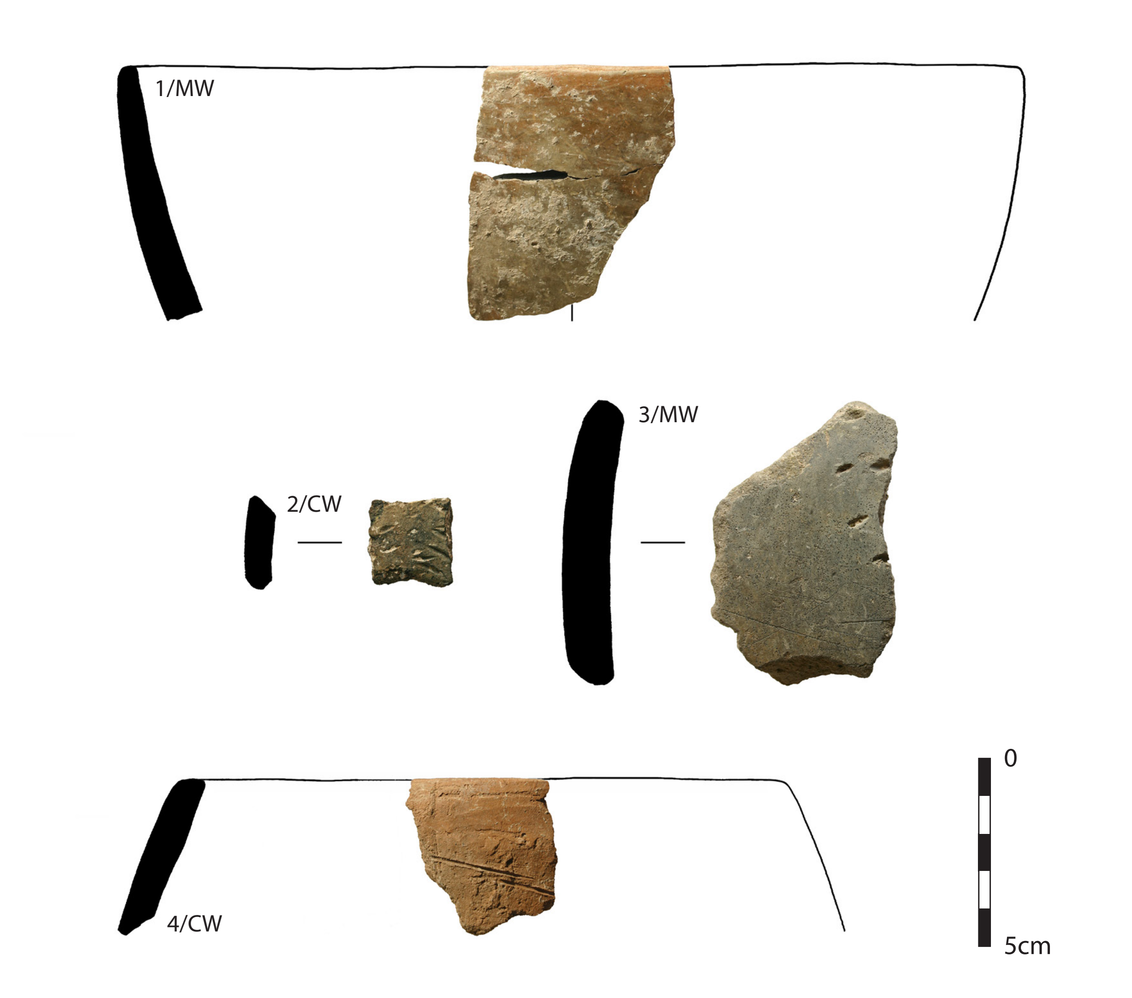

Fig. 10.22 Pottery found below the inner enclosure ditch (F3) at Canale Gavitella. Scale 5cm

There are three sets of similarly configured features, not just that comprising the main enclosure ditch (F1/F6). F3 and F5 are of similar depth (just under two metres), wider than they are deep, and have grey silt fills with what look like tip lines. F7 and F8 have similar grey silt fills but no clear tip lines. The two sets also have a similar spatial relationship to each other, with the wider feature being to the southeast. This suggests the possibility that each set belongs to a separate ditch, not just F1 and F6 – i.e. that there were *three* enclosure ditches. If we explain the breadth of sections F3 and F5 in the same way as F1 at Cava Petrilli, that is to say that the section is cut obliquely across them, the ditches represented by F3/5 and F7/8 cannot have been on line. The physical relationship between sections F3 and F8 and F5 and F7, moreover, can only be explained if one of the pairs to which they belonged cut and/or replaced the other, a view consistent with the deliberate infilling of F3/5 observed above. (F3/5 was backfilled and replaced by F7/ 8) (Fig. 10.23). At some point during the Neolithic, therefore, part of the site was refashioned. By contrast the main enclosure ditch, which is deeper than (approximately two metres in both sections), spatially separate from, and had a sedimentological environment distinct from those of the interior enclosure ditches, appears to have been a one-off.

DISCUSSION AND CONCLUSION

Summary

Exposed Neolithic features were investigated at two sites formerly assigned to Jones' size-class 1: Cava Petrilli (J4), to the west of the plain, and Canale Gavitella (J96) to the south. The sections through them were in each case the result of gravel quarrying.

At Cava Petrilli this had destroyed most of the site visible in the aerial photo, leaving three sections through the main enclosure ditch, and sections through several features located outside of it. Three sections were subject to detailed sedimentological analyses. These showed: firstly, that that there were two successive enclosures, one small and comprising a single ditch only and one much larger, possibly comprising a set of two ditches, and that middening and/or pottery use and agriculture in the vicinity of the small enclosure pre-dated the digging of the larger enclosure ditch; secondly, that the main enclosure ditch was surrounded on the inside by a bank; and thirdly, that the main enclosure ditch was at first filled slowly by material generated by middening, and/or pottery use and agriculture, and then deliberately and rapidly backfilled with material from the bank. We also believe that the sedimentological environment close to the main enclosure ditch was the same on both sides of the site and postulate that main enclosure ditch was dug slowly while the earlier, smaller enclosure ditch remained open.

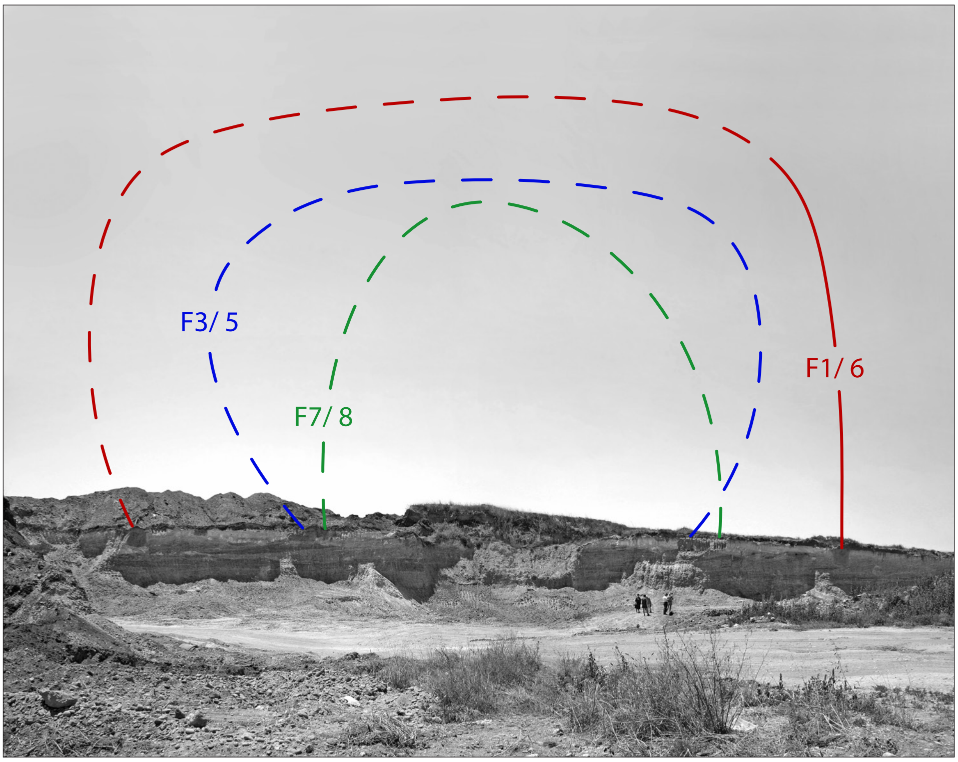

Fig. 10.23 Reconstructed plan of Canale Gavitella. Solid line = visible on the airphoto; dashed line = inferred from the features visible in the section

At Canale Gavitella, the quarrying had clipped-off one end of the site visible in the aerial photo, twice cutting the main enclosure ditch and those of two interior enclosures. It also cut two smaller (uninterpreted) features. Owing to the depth of the site, and the consequent inaccessibility of the features, we were not able to conduct detailed sedimentological analyses. Nonetheless we were able to infer the existence of a sedimentological environment different from that of Cava Petrilli in the vicinity of the main enclosure ditch, and possibly in the interior of the site as well, and a different fill mechanism for at least one of the interior enclosures, which had apparently been deliberately filled before being re-cut/replaced on a

slightly different line by the other interior enclosure (Fig. 10.23). The development of the site therefore was very different from that of Cava Petrilli. We are however of the view that both Cava Petrilli and Canale Gavitella utilised some kind of Neolithic feature template.

Understanding sites

Jones summed-up his study of the aerial photo record in terms of 'economy and society', 'morphology and hierarchy', and 'ethnographic interpretations' (1987, chapter 4). In the context of our work, none of these themes are particularly useful. In part this is because current views on the nature and ubiquity of 'ritual' in early societies have undercut such ideas; in part it is because of the nature of the data we have recovered from them, which do not easily relate to these traditional themes. It is not realistic to categorise a site socially in terms of visible size and morphology when these reflect neither the amount of effort that went into its construction, its three-dimensional reality underground, nor the changes that it underwent over time. Perhaps Cava Petrilli and Canale Gavitella were 'homesteads' as Jones would have us believe – although we doubt it – but, even if they were, there was a great deal more to them than either the name or his size-class suggests.

How then are we to understand sites? What our work brings out in particular is the structural and conceptual nature of boundaries and the spatial and chronological relationships of these to each other, and the cultural material contained within them, clearly a matter of importance when their vegetation marks comprise the principal source for understanding the region during the Neolithic.

Boundaries

It is clear that ditches were not boundaries in the sense that we would understand them today. Like a modern wall they were dug to a monumental template that presumably answered some practical or conceptual need – but they were not immutable, as is shown by the possible replacement of the small nucleus by the much larger enclosure at Cava Petrilli and the realignment of the interior enclosure at Canale Gavitella; not themselves out of bounds, as is shown by the trampling at Cava Petrilli; not permanent, as is shown by the slighting of the main enclosure ditches at Cava Petrilli and – probably – Canale Gavitella as well; or used to reorganise everyday type activities, as is shown by the continued use of the area around the nucleus and immediately outside the main enclosure at Cava Petrilli for middening and/or pottery use and agriculture. As they stand, these observations are explicable in a variety of ways. For example the evidence for everyday activity around and even in the ditches, with possible middening between or on the outside, suggests a standard separation of interior and exterior activities. By reinforcing the identity of and perhaps protecting those on the inside, the ditch enhances this separation. But why, after investing so much in them were they then so thoroughly slighted? To the 21st-century prehistorian steeped in the traditions of post-processual archaeology this cries ritual. Indeed the notion that activity and features on these sites might be both ritual and everyday accords very well with current views on early societies, as does the notion that ritual – including perhaps the digging and filling of monumental ditches – might be cyclical in character. We must take care however not to fall into the trap that Jones did when he limited his interpretation of them to the themes outlined above, for there are many other possibilities which would accord as well with our limited data. It is clear, however, that these ditches are much more complicated than they seem from the air.

Artefacts and ecofact distribution

One of the most startling aspects of Cava Petrilli was the amount and range of culturally generated material there – 45 pottery sherds from the sections alone (Appendix 4), not to mention the daub, the bone, the coprolites etc. In one way or another the site was engaged

in a wide range of different activities. These were seen by us in two parts of the site, both proximate to the main enclosure ditch, and were absent from a third, well outside of it. How we interpret this depends on whether the material was in a primary or a secondary position, prior to entering the ditch. If it was in a primary position, this wide range of activities – perhaps excluding those that generated coarse pottery, which we saw in only one location – occurred around the perimeter of the site but not, apparently, well outside of it. If it was secondary – our view – middening occurred around the perimeter of the site but not well outside it. We do not know what activities occurred within the site.

By contrast, Canale Gavitella yielded few finds. In part this has to be attributed to the inaccessibility of the exposed features, none of which we were able to examine close-to, but given the different numbers of pottery sherds seen on the ground below the exposed features at Cava Petrilli and beneath exposed features at other sites, we believe the density of culturally generated material at Canale Gavitella to be genuinely low, i.e., the activities that occurred in and around it were different from those that occurred at Cava Petrilli and these other sites, or the material generated by these was deposited elsewhere, possibly in the area outside of the site where we noted a concentration of surface pottery.

The implications of this for our understanding of the way Neolithic sites operated locally are of some interest. Cava Petrilli was engaged in a very wide range of activities indeed. In two approximately 5cm thick slices through the enclosure ditch, the whole Neolithic revolution in the Mediterranean is represented. The site therefore was in no sense a specialist one. At Canale Gavitella however there was sufficient social discipline to ensure the concentration of waste material outside the perimeter. Much the same is likely to be true of some other Neolithic sites, like La Panetteria I (site J1), which lack abundant surface finds, Monte Aquilone (site J207), where surface finds are concentrated within the inner enclosure, and Masseria Mansueto (site A31), where they are concentrated outside (and downslope) of the visible enclosure. These sites suggest to us where finds might be made (certainly not just within the ditches visible on the aerial photos) and what these might mean, and provide us with a context in which to consider artefact distribution generally. Likewise they highlight and are highlighted by those sites where there is a restricted range of artefactual material – frequently only pottery or only struck stone – or where particular categories of it are concentrated and/or occur in isolation.

Chronology

A final issue raised by the study of the foregoing sections is that of enclosure chronology. On the basis of the pottery identified, the two sites could belong to quite different periods, Canale Gavitella, which yielded plain and Impressed wares only (Fig. 10.22), being the earlier; Cava Petrilli, which yielded, plain, impressed and Passo di Corvo-type painted wares (Figs 10.3, 10A4.1 and 10A4.2), being later. Both too went through a number of clearly punctuated phases of activity (half a dozen in just a dozen or so features). For the region generally, the survival of this type of evidence holds out the promise of a truly representative chronological sequence and the identification of both genuine chronological differences and time-transgressive trends.

The implications of conventional archaeology for our understanding of the social and sensory landscapes of the Apulian Neolithic

The investigation of fortuitously exposed archaeological sections at Cava Petrilli and Canale Gavitella yielded huge quantities of data, which add to and qualify both existing conventional, and new, phenomenologically based interpretations of the Apulian Neolithic. The lesson of the quarries is that there is more to a Neolithic enclosure than meets the eye, looking from above on a single day in 1943 or 1945. The examination of the archaeological features exposed in them greatly extends our knowledge, not only by revealing the enclosures' true physical dimensions, but also by providing us with glimpses of their

conceptual and chronological dimensions. We studied two quarry sites and 180-odd Mass Survey sites. The former are data heavy and each has a distinct and developed identity of its own, whereas each Mass Survey site is by definition a tiny part of a larger whole, which in most cases had our attention for a few hours only. Ultimately however what interested us, in the quarries and during the Mass Survey, and what was experienced by the occupants of the sites, was the same – space, time, culture, landscape etc. What, for example, is a ditch on the scale of those considered here if not a piece of landscape; and what is a landscape, if not the accumulation and dissipation of nature and culture over time, a combination that can only be glimpsed by looking both above and below ground? Thus the traditional archaeological opportunity turns out to be a phenomenological one as well. It was never our intention to "excavate" on this project, but we now believe that had we not seen these features, our appreciation of the social and sensory landscapes of the Apulian Neolithic would be lacking, just as we continue to believe that without phenomenology, conventional archaeology's appreciation of the region's Neolithic is lacking. Our investigation of the features exposed at Cava Petrilli and Canale Gavitella bring home to us the realities of surface survey and thus add greatly to our wider fieldwork.

Fig. 10.24 Renewed quarrying at Cava Petrilli. The main enclosure ditch (below the fence) survives only as a single elongated section

Future work

During the Mass Survey we found 11 standing sections through Neolithic enclosures and nearly 30 exposed features and it is certain that the cleaning of spoil and vegetation on these sites would reveal more (Appendix 10.8). Any of these sites could yield divergent data of the sort recovered by us from Cava Petrilli and Canale Gavitella, which could add significantly to our knowledge and understanding of the archaeology of the Plain, and in our view they should be investigated. And given what happened to Cava Petrilli (Fig. 10.24), they should be investigated soon, and monitored over time. For the same reason, we would also recommend the monitoring of other everyday interventions on the Plain, be they for irrigation or the erection of wind turbines, or whatever, and the limited, targeted excavation of different locations within sites, of sites of different class, of sites in different parts of the Plain, and of sites on differing geologies. Only then will we be able fully to

contextualise our phenomenological investigations of the Apulian Neolithic, just as only through phenomenology are we able to fully contextualise what we know of the Apulian Neolithic through conventional survey and excavation.

NOTES

1 Whole or fragmentary wheat grains were recorded in F1 (12) and F2 (2). The preservation of the grains is poor but they are probably glume rather than free-threshing wheats (and emmer rather than einkorn). Sue Colledge.

Chapter 10 Appendix 1:

Soil Micromorphology at Cava Petrilli

Soil Micromorphology at Cava Petrilli

Richard Macphail

Three monolith samples were collected from Cava Petrilli, two from the main enclosure ditch (F2), and one from small enclosure ditch nearby (F3). The monoliths from the main enclosure ditch extended from the base of the feature and straddled the lower ditch fills. The lower monolith, which measured 450mm, was collected in two parts during 2004 and covered contexts 2, 3 and 4. The upper monolith, which measured 450mm, was collected in a single piece in 2005 and covered layers 4 and 6 (see Table 10.1) (Fig. 10A1.1). Owing to the weathering of the feature between the 2004 and 2005 seasons, it was necessary to offset the 2005 monolith to the left by about 100mm. The monolith from F3 extended upwards from the base of the feature, straddling layers 32 and 35 (see Table 10.2) (Fig. 10A1.2). The objective of the soil micromorphological investigation was to assist in interpreting the nature/depositional environment of these deposits through the identification and analysis of their microstratigraphy.

METHODS

The undisturbed monoliths were impregnated with a crystic resin mixture, cured and cut up into 75 x 50mm blocks, and sent to Quality Thin Sections of Tucson, Arizona, for thin section manufacture (Murphy 1986). The thin sections from the main enclosure ditch are, from the bottom up, MT-G3, MT-G2 and MT-G1 (2004), MT-GF2B and MT-GF2A (2005), and from F3, MT-GF3 (2005).

The 6 thin sections were analysed both as scanned images and under the petrological microscope, using plane-polarised light (PPL), cross-polarised light (XPL), oblique-incident light (OIL) and fluorescent microscopy (blue light), at magnifications from x1 to x200/400. They were described and counted according to the standard authorities and reference studies on soil micromorphology in archaeology (Bullock 1985; Courty *et al.* 1989; Macphail & Cruise 2001; Stoops 2003). Soil micromorphological interpretations, covering both natural and anthropogenic materials, were based upon the identification of soil microfabric types (SMTs), which were combined with archaeological context information gathered on site to produce microfacies types (MFTs) (Courty 2001; Goldberg & Macphail 2006; Macphail & Cruise 2001). In addition microprobe mapping of a range of elements was conducted on thin section MT-GF2A. Detailed descriptions and counts are presented in Tables 10A1.1–10A1.3, at the end of this Appendix.

RESULTS

The enclosure ditch

Thin section MT-G3 showed the base of layer 2 to comprise a laminated, almost pure anthropogenic deposit comprising water-sorted fine ash, charcoal and phytoliths (Figs 10A1.3). This part of the context is remarkable for the dearth of natural mineral components (e.g. quartz). It appears to have been generated by the localised inwash/wind blowing of residues from cereal processing and/or the burning of *Gramineae*-fed stock stabling waste, and was affected by post-depositional fine rooting, and by fine and coarse burrowing by small mammals, insects and smaller mesofauna. The identification of void infills and 'muddy' pans within it suggests that it was trampled at times.

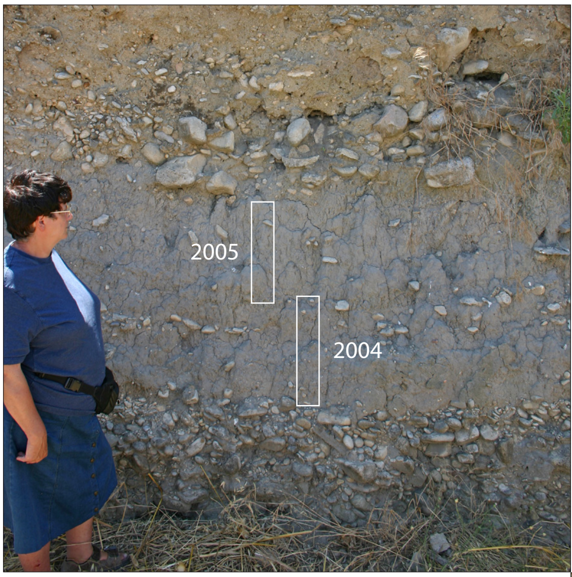

Fig. 10A1.1 Position of the monolith samples taken from the main enclosure ditch (F2)

Fig. 10A1.2 Position of the monolith sample taken from the small enclosure ditch (F3). Scale 1m

Gently water-lain very fine charcoal, ash and phytoliths continued upwards through layer 2 (MT-G2). These sediments reflect the continuing local abundance of residues from the use and processing of cereals/ *Gramineae*, with, in addition, inputs of natural quartz silt, and probable human cess (human excrement) or small animal scat, the latter evidenced by the presence of amorphous organic matter, rare yellow stained fine bone, possible human coprolitic material (Fig. 10A1.4), and probable iron phosphate void infills related directly to cess inputs and/ or the weathering of dung, bone and ash. At times the fill incorporated

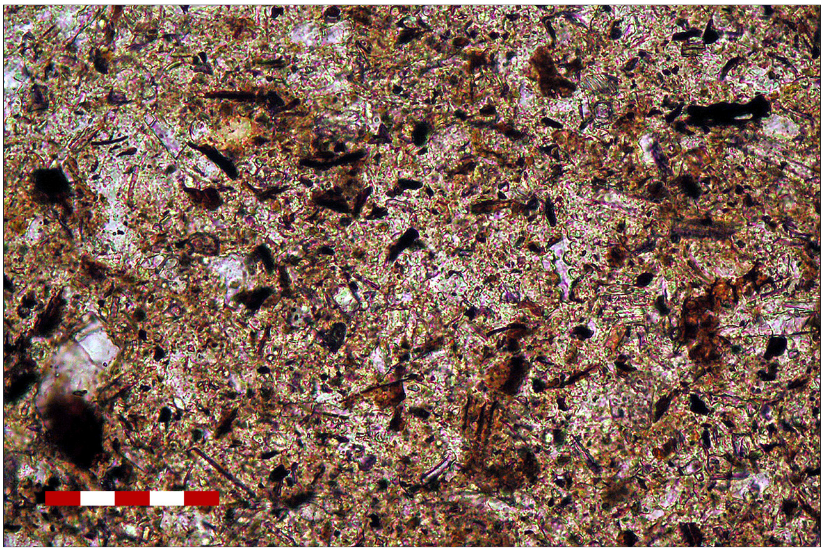

Fig. 10A1.3 Ashy, fine charcoal and phytolith-rich sediments from the base of Cava Petrilli's main enclosure ditch, under plain polarized light (MT G3). The transparent rod-shaped objects are the phytoliths. Scale ~0.1mm

Fig. 10A1.4 Fragment of stained 'coprolitic' bone in the ashy, fine charcoal-rich sediments comprising the lowermost layer of Cava Petrilli's main enclosure ditch, under plain polarised (top) and blue light (bottom) (MT-G2). The apatite in the bone is autofluorescent under blue light. Scale ~0.25mm

fine calcitic clay, presumably derived from the *crosta* through which the feature was cut, and is best described as muddy slurry (Fig. 10A1.5). Trace amounts of faecal spherulites provide further evidence of dung inputs (cf. Canti 1997; 1999).

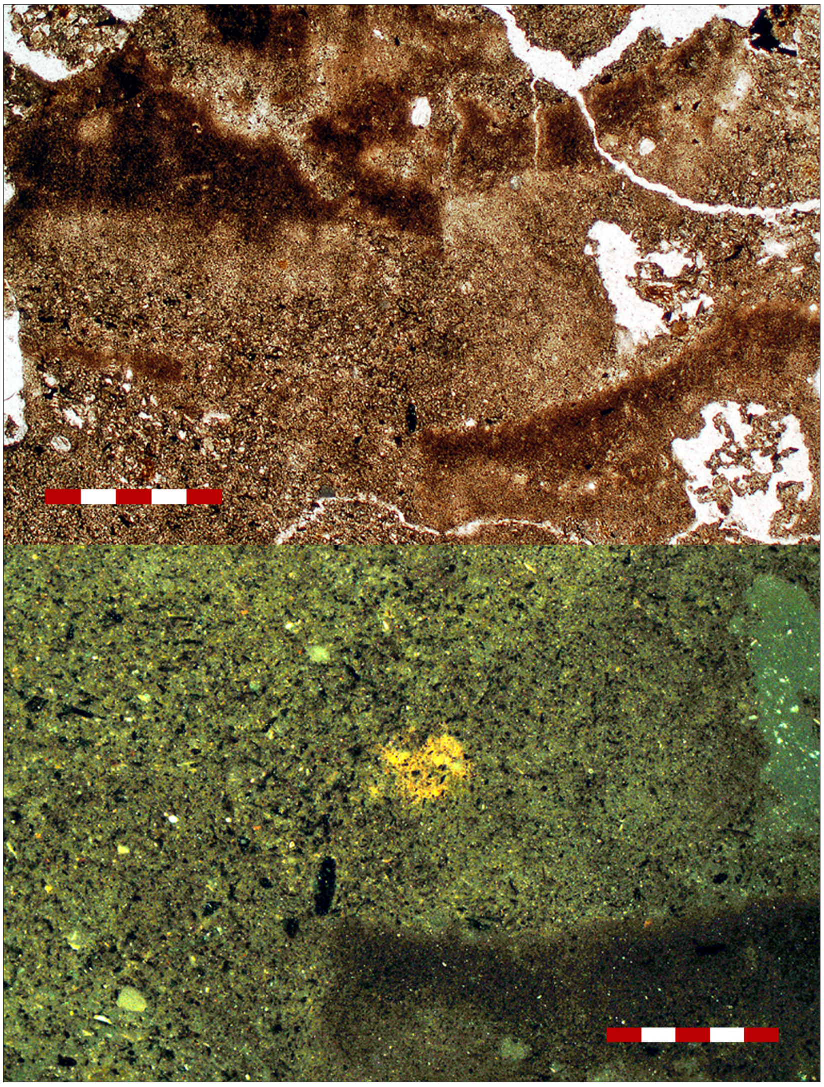

Fig. 10A1.5 Muddy laminae and wash features with burrow and root traces in the lowermost layer of Cava Petrilli's main enclosure ditch, under plain polarized (top) and oblique incident light (bottom) (MT-G2). Note the fine charcoal and lack of quartz silt. Scales ~1mm (top) and ~0.5mm (bottom)

At the top of the 2004 monolith, thin section MT-G1 (Fig. 10A1.6) straddled the stony interface (layer 3) between layers 2 and 4. It shows burrowing to have brought down sediment into layer 2, possibly from layer 3 or above, that is less ashy, but more silty and contains more charred humic material than the surrounding matrix, which seems to derive from a deposit of burned sheep/ goat dung which formerly overlay it. Examples of the last are identifiable. These burnt dung fragments, the high phytolith content, as well as the amount of silt present, which is incorporated into animal dung through drinking, indicate a fill possibly dominated at times by burned stabling/stock management residues. For this reason it is postulated that the stones provided a 'surface' created by stock in the ditch.

The thin sections from layers 4 and 6 (respectively MT-GF2B and MT-GF2A) closely resemble those from layer 2, which they resembled macroscopically. Again a laminated fill is indicative of a gently water-lain deposit, and there are indications of sloping muddy slurries coming in from the side. Again, too, abundant very fine charcoal and phytoliths

testify to inputs of burned *Gramineae* from cereal processing and/or the burning of *Gramineae*-fed stock stabling waste. Silting is ash-rich and calcitic, with some inclusion of natural marly clay. Fine amorphous organic matter, iron staining, traces of coprolitic fine bone and secondary probable iron phosphate testify to continuing inputs of inputs of probable cess or small animal scat. This is confirmed for layer 6 (MT-GF2A) by the microprobe data (Table 10A1.3), which showed high proportions of phosphorus with calcium and iron and potassium, consistent with the weathering of bone, dung and ash.

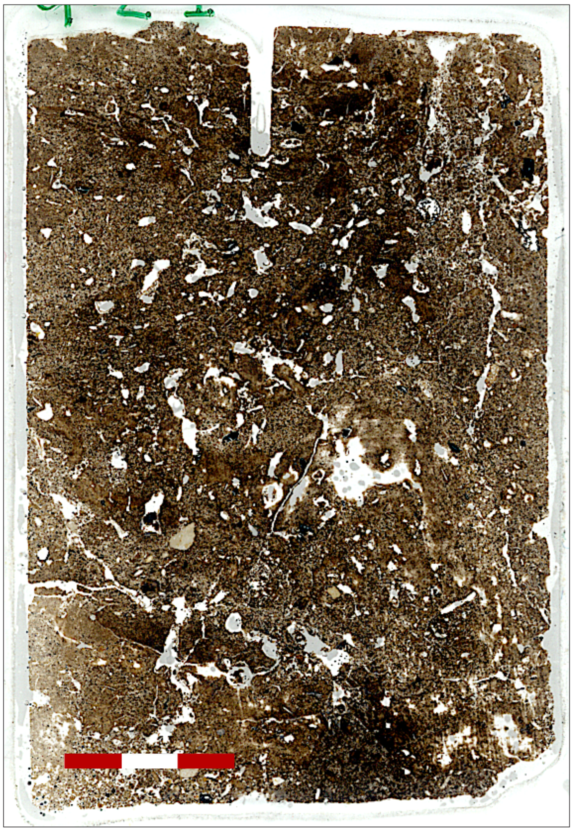

Fig. 10A1.6 F2: scan of thin section MT-G1 showing dark ashy and charcoal-rich sediment with relict laminae and later burrows. Scale ~15mm

Pit F3

By contrast the sampled sediments from F3 (MT-GF3) are quite different in character, comprising a poorly sorted mixture of fine calcareous ‘soil’, with ash and phytoliths, biologically mixed with coarser clastic mineral material comprising mostly silt- to sand-size quartz, common gravel-size limestone, fossil and *crosta*. The layer also contained examples of gravel-size fragments of pot (2 types), chert, burned daub, weakly burned ‘clay’, sand-size bone fragments and rare charcoal. The deposit was strongly burrowed, indicating a short period of stasis prior to the minor inwash of muddy calcareous/ashy deposits analogous to those identified in the enclosure ditch.

SUMMARY

The ‘grey silt’ comprising the lower fills of the main enclosure ditch at Cava Petrilli contains cultural sediments of some note that clearly testify to local ashing of Gramineae material, although it is not possible to ascertain how much is derived from cereal processing and how much from the disposal of burned animal dung. For the most part these deposits were gently water-lain, although there is evidence for the occasional, more violent inwash of mixed muddy slurry. Fragments of burned sheep/goat dung are clearly recognisable approximately halfway up, where a discontinuous stone line may relate to animal trample. The ditch also seems to have been used as, or for the disposal of waste from a latrine. The lowermost fills

of pit F3 comprise a deliberate dump, which was succeeded, after a short hiatus, by fine ditch silting analogous to that identified in the main enclosure ditch.

DISCUSSION

During the Neolithic of the northern Mediterranean countries (northern Italy and southern France), caves were foci of pastoralists who stabled goats, sheep and cattle, then burned the dung producing typical ashed deposits (Binder & Maggi 2001; Boschian & Montagnari-Kokelji 2000; Macphail *et al*. 1997; Maggi 1997; Sordoillet 1997; Wattez 1992; Wattez *et al*. 1990). Outdoor sites are characterised by less well preserved ashy dung deposits and usually only in pits, for example, at Early Neolithic Ecsegfalva, Hungary (Whittle 2000; 2007). Within these occupation deposits coprolitic material/cess is ubiquitous although in small amounts. In the Tavoliere, the waterlain ditch fill material contains what may be described as small amounts of probable cess or latrine waste.

TABLES

Sample no	Context	Depth (from top of monolith individual) Soil Micromorphology (SM)	Microfacies type (MFT) Soil microfabric type (SMT)	Preliminary Interpretation and Comments
MT-GF2A	F2, layer 6	20–100mm SM: Dominantly homogeneous. *Microstructure*: dominantly laminar (as MT-GF2B; 0.2–2.0mm thick laminae), and massive, with burrows; 20% voids, fine and medium channels, open and closed medium vughs; complex packing voids (burrow fills). *Coarse Mineral*: (C:F (coarse: fine) frequent SMT 1: 15:85; dominant SMT 2: 0:100 (clay to very fine silt); as MT-G3, with dominant silt-size quartz; layer at 70–72mm depth (SMT 3, C:F, 90:10). *Coarse organic and anthropic components*: rare traces of fine charcoal (<1mm), with examples of 2–3mm size wood charcoal)[very abundant very fine charcoal]; very rare root traces (including partial calcium carbonate replacement); trace amounts of rare fine bone yellow stained (?) 'coprolitic' bone (50–100μm); rare to occasional 100–200μm size patches of amorphous organic matter; examples of 2 weathered biogenic granules (earthworm?) in burrowed upper part of thin section. *Fine fabric*: SMT 1 and 2, as in MT-G2 (see Amorphous pedofeatures); SMT 4: dotted whitish cloudy grey (PPL), very high interference colours (close porphyric, crystallitic b-fabric), white with black dots (OIL); dominated by coarse (wood?) ash crystals, very abundant fine charcoal. *Pedofeatures*: *Textural*: very abundant laminae/ pans, associated with abundant void coatings/ associated intercalations; *crystalline*: rare traces of micritic semi-pseudomorphic replacement of fine roots; many microsparitic void coatings and micritic impregnations; *amorphous*: many fine weak iron impregnative mottles, some associated with amorphous organic patches; *fabric*: in upper part of thin section very abundant very broad (10mm) burrows.	MFT B2 SMT 2 (with SMT 2 & 4)	As below, but dominantly muddy slurry deposition of (shallow sloping) ashy deposits containing fine amorphous organic matter that is weakly iron replaced, possibly reflecting a cess input; one sloping thin layer of pure wood ash. *Muddy, dominantly anthropogenic ditchfill silting.*
MT-GF2B	F2, layer 4	360–460mm SM: generally homogeneous. *Microstructure*: massive, with burrows and laminar (e.g. fine silt [SMT 2] and coarse silt [SMT 1; see below MT-G3] 0.5–2.0mm thick laminae); 20–25% voids, fine and medium channels, open and closed medium vughs; complex packing voids (burrow fills). *Coarse Mineral*: (C:F (coarse: fine) SMT 1: 15:85; SMT 2: 0:100 (clay to very fine silt); as MT-G3, with dominant silt-size quartz. *Coarse organic and anthropic components*: occasional fine charcoal (<1mm), with rare examples of 2–8mm size wood charcoal)[very abundant very fine charcoal]; rare root traces (including partial calcium carbonate replacement); rare traces of fine bone yellow stained (?)'coprolitic' bone (100μm); rare traces of amorphous organic matter. *Fine Fabric*: SMT 2: highly speckled cloudy yellowish brown (PPL), moderately low interference colours (crystallitic b-fabric, XPL), finely speckled dark greyish brown (OIL); very abundant very fine ash and charcoal, rare traces of possible faecal spherulites. *Pedofeatures*: *Textural*: very abundant void coatings/ associated intercalations and laminae/ pans; *crystalline*: rare traces of micritic semi-pseudomorphic replacement of fine roots; rare microsparitic void coatings and micritic impregnations; *amorphous*: rare traces of yellowish probable Fe phosphate; *fabric*: very abundant very broad (10mm) burrows to broad (1–2mm) burrows; *excrements*: many (burrow-associated) very thin (<100μm) to thin (<500μm) excrements.	MFT B1 SMT 1 & 2	Water lain ash (some sloping muddy slurries), charcoal and phytolith residues from use/ processing of cereals/ *Gramineae*; with additional inputs of natural quartz silt, local calcitic marly clays, and probable cess (yellow stained fine bone; amorphous organic matter; iron and phosphate staining); trace amounts of faecal spherulites indicative of stock; with burrow-mixed phytoliths-dominated ashy deposits. *Muddy (sloping?), dominantly anthropogenic ditch silting.*

Table 10A1.1 Cava Petrilli, sections through ditches F2 and F3: soil micromorphology descriptions

Sample no	Context	Depth (from top of monolith individual) Soil Micromorphology (SM)	Microfacies type (MFT) Soil microfabric type (SMT)	Preliminary Interpretation and Comments
MT-G 1	F2, layer 2 (top)/ 4	30–155mm SM: moderately homogeneous with laminae of SMT 2 and burrowed SMT 3. *Microstructure*: channel, vugh and burrow; 30% voids, with fine to medium channels, fine vughs and coarse burrows. *Coarse Mineral*: as MT-G2, with very dominant silt and very fine sand-size quartz. *Coarse organic and anthropic components*: many fine charcoal (0.1–0.5mm); occasional root traces (including partial calcium carbonate replacement); occasional to many traces of fine amorphous organic matter and plant fragments (possiblew burrowed dung); example of 1.2mm size herbivore coprolite/ dung (convolute fabric with short plant fragments indicating sheep/goat); rare (?)burned dung; rare traces of articulated phytolith sheets. *Fine fabric*: SMT 3: much dotted greyish yellow brown (PPL), moderate interference colours (open porphyric, crystallitic b-fabric, XPL); greyish brown with many black specks (OIL); humic staining, very abundant fine charcoal, many phytoliths and ash. *Pedofeatures*: similar to MT-G2; *fabric*: very abundant burrow mixing of 'coarse' SMT 3 with earlier laminated very fine SMT 2.	MFT C SMT 3 & 2	Biologically mixed junction of SMT 2 (layer 2) and overlying SMT 3 (layer 4), with burrowing bringing in more silt-rich and humic charred and burned sheep/goat dung residues (including one weathered fragment); amount of silt also indicates burned stabling residues. *Mainly anthropogenic ditch silting.*
MT-G2	F2, layer 2	170–250mm SM: Moderately homogeneous. *Microstructure*: massive, with burrows and laminar (e.g. fine silt [SMT 2] and coarse silt [SMT 1; see below MT-G3] 0.1–1.0mm thick laminae); 25% voids, fine and medium channels, open and closed medium vughs; complex packing voids (burrow fills). *Coarse Mineral*: (C:F (coarse:fine) SMT 1: 15:85; SMT 2: 0:100 (clay to very fine silt); as MT-G3, with dominant silt-size quartz. *Coarse organic and anthropic components*: rare traces of fine charcoal (<1mm), with one example of 6mm size wood charcoal)[very abundant very fine charcoal]; rare root traces (including partial calcium carbonate replacement); rare fine bone yellow stained (?)'coprolitic' bone (200–1500µm); rare traces of amorphous organic matter; example of grouped fungal spores. *Fine fabric*: SMT 2: highly speckled cloudy yellowish brown (PPL), moderately low interference colours (crystallitic b-fabric, XPL), finely speckled dark greyish brown (OIL); very abundant very fine ash and charcoal. *Pedofeatures*: *textural*: very abundant void coatings/ associated intercalations and laminae/ pans; *crystalline*: rare micritic semi-pseudomorphic replacement of fine roots; many microsparitic void coatings and micritic impregnations; *amorphous*: rare traces of yellowish probable Fe phosphate, rare iron staining/ hypocoatings around some fine channels; *fabric*: very abundant very broad (10mm) burrows to broad (1–2mm) burrows; *excrements*: many (burrow-associated) very thin (<100µm) to thin (<500µm) excrements.	MFT B1 SMT 1 & 2	As below – water lain ash (some input of local calcitic marly clay), charcoal and phytolith residues from use/ processing of cereals/ *Gramineae*; with additional inputs of natural quartz silt, and probable cess (yellow stained fine bone; amorphous organic matter; iron and phosphate staining). *Dominantly anthropogenic ditch silting with calcitic marly clay silting.*

Table 10A1.1 cont. Cava Petrilli, sections through ditches F2 and F3: soil micromorphology descriptions

Sample no	Context	Depth (from top of monolith individual) Soil Micromorphology (SM)	Microfacies type (MFT) Soil microfabric type (SMT)	Preliminary Interpretation and Comments
MT-G3	F2, layer 2 (base)	370–445mm SM: Moderately homogeneous. *Microstructure*: massive, with burrows and laminar; 25% voids, fine and medium channels, open and closed medium vughs; complex packing voids (burrow fills). *Coarse Mineral*: (C:F (coarse:fine limit at 10µm) 05:95; moderately well sorted fine and medium sand-size rounded quartz, sub angular limestone/ chalk (?*crosta*), with feldspar. *Coarse organic and anthropic components*: rare fine charcoal (<1mm)[very abundant very fine charcoal]; rare root traces (including partial calcium carbonate replacement); rare traces of fine sand-size fragments of yellow stained, non-birefringent (phosphate) layered phytolith material ('stabling crust' fragment?); rare traces of fine sand-size aggregate of silt and phytoliths (weakly burned dung residue?); examples of 1mm long articulated phytoliths. *Fine fabric*: SMT 1: heavily dotted pale yellowish brown (PPL), high interference colours (open porphyric, crystallitic b-fabric, XPL), heavily black speckled grey, with occasional red specks (OIL); very weak humic staining, very abundant very fine to fine charcoal/ charred organic matter (*Gramineae*?), very abundant phytoliths. *Pedofeatures*: *textural*: very abundant fine (100µm) laminae (ash and phytoliths), pans, massive infills and void infills – 6mm thick (with closed vughs); *crystalline*: rare micritic semi-pseudomorphic replacement of fine roots; *amorphous*: rare traces of iron staining/ hypocoatings around some fine channels; *fabric*: very abundant very broad (10mm) burrows; *excrements*: many (burrow-associated) very thin (<100µm) excrements.	MFT A SMT 1 (& 2)	An almost pure anthropogenic deposit of water-sorted and laminated fine ash, charcoal and phytoliths, that was possibly trampled at times; post-depositional effects of fine rooting and fine and coarse burrowing (small mammals, insects and smaller mesofauna). *Very localised inwash/ wind blown residues from cereal processing/ burning of Gramineae fed stock (stabling waste) in water lain ditch fill.*
MT-GF3	F3, layer 32/35	80–270mm SM: very heterogeneous. *Microstructure*: massive with burrows; 25% voids, fine channels to very broad chambers (burrows); few complex packing voids. *Coarse Mineral*: C:F, 65:35, very poorly sorted silt, sand and gravel-dominated (9mm max.), dominant limestone, fossils, tufa fragments (crosta), with example of pot (eg. 9mm – weakly calcitic with coarse silt-size quartz, and large fragments of weakly iron-stained marly clay), burnished/ painted pot (2mm – weakly ferruginous fine sand-dominated, with brown clay possible slip); examples of burned dark brownish daub and orange loams ('brick'); quart silt and sand. *Coarse organic and anthropic components*: in addition to the above, rare coarse (sand-size) bone, rare traces of charcoal; example of chert (4mm); very rare root traces (including partial calcium carbonate replacement); rare examples of crushed landsnail shell. *Fine Fabric*: SMT 5: finely speckled greyish brown (PPL), high interference colours (close porphyric, crystallitic b-fabric, XPL), pale greyish brown (OIL); weakly humic stained calcitic with ash crystals and many phytoliths; upper part of thin section includes MFT 2 material. *Pedofeatures*: *textural*: occasional dusty infills in upper part of thin section (SMT 2); *crystalline*: rare traces of micritic semi-pseudomorphic replacement of fine roots; *fabric*: almost total biological fabric with a very broad (8mm) burrow fill across the slide, and occasional very broad 94mm) (insect?) burrows, with very thin (100µm) organo-mineral excrements.	MFT D SMT 5	Poorly sorted mixture of fine calcareous 'soil' containing ash and phytoliths, biologically mixed with dominantly coarse mineral material composed of silt to sand-size quartz, common gravel-size limestone, fossil and tufa clasts (crosta); with examples of gravel-size fragments of pot (2 types), chert, burned daub, weakly burned 'clay', and sand size bone fragments and rare traces of charcoal. The deposit was strongly burrowed prior to minor inwash of muddy calcareous/ ashy deposits. *Spread/dump of gravel-size limestone rock that includes examples of coarse artefacts and bone fragments; biologically worked (short stasis?) then latterly affected by ensuing ditch silting.*

Table 10A1.1 cont. Cava Petrilli, sections through ditches F2 and F3: soil micromorphology descriptions

Sample No.	MT-GF2A	MT-GF2B	MT-G1	MT-G2	MT-G3	MT-GF3
Feature/ layer	F2					F3
	6	4	2/4	2	2 base	32/35
<100 μm Excrement					5–10%	1%
Artefacts						5–10%
Ash	>20%	>20%	5–10%	>20%	>20%	
Bone	1%	1%		Ten pieces		<1%
Burned dung			<1%		x1	
Burrows	2–5%	10–20%	10–20%	5–10%	>20%	>20%
Coarse charcoal	1%	2–5%	5–10%	1%	<1%	1%
Dung			5–10%/ one piece			
Fe phosphate	?	1%		1%		
Fe staining	5–10%		1%	1%	1%	
Gravel						>20%
Infills	2–5%	5–10%	2–5%	5–10%	>20%	
Laminations	>20%	5–10%	5–10%	>20%	5–10%	
Mineral	<1%	<1%	5–10%	<1%	1–5%	>20%
Phytoliths	2–5%	>20%	5–10%	>20%	>20%	
Root traces	1%	<1%	2–5%	<1%	<1%	1%
Secondary $CaCO^3$	1%	<1%	<1%	5–10%	<1%	1%
Stabling crust?					One piece	

Table 10A1.2 Cava Petrilli, sections through ditches F2 and F3: micromorphological counts

Element	Al	Ca	Fe	Mg	Na	P	Si	Ti	Mn	S	Cl	K
	n = 92											
%	2.423	4.038	1.161	0.317	0.21	0.32	9.208	0.111	0.029	0.025	0.155	0.923

Table 10A1.3 Cava Petrilli, section through ditch F2, layer 6 (sample MT-GF2A): microprobe mapping of key elements

Chapter 10 Appendix 2:

Optically Stimulated Luminescence (OSL) at Cava Petrilii

Application of OSL to ditch sequences at Cava Petrilli

David Sanderson

The application of luminescence dating to archaeological sediments has been facilitated by the development of simple portable OSL readers by the Scottish Universities Environmental Research Centre (SUERC) (Sanderson & Murphy 2010). Work has been undertaken using the portable units to help sample archaeological sediments, with applications to Neolithic ditches in Orkney, Mesolithic land surfaces in the inner Hebrides, and applied to archaeology in Ireland during road construction (Burbidge *et al.* 2008).

SUERC portable OSL readers

The need for simple readers capable of making rapid OSL determinations during sampling trips was recognised during earlier work in SE Asia. Laboratory profiling of sediments from ancient canals in Cambodia (Sanderson *et al.* 2003; 2007) following fieldwork in 2002, 2004 and 2005, succeeded in identifying age discontinuities at boundaries between older regional substrates and the archaeological canal-infills. Areas of mixed-age sediments near basal fills were identified, as were layers containing re-deposited material within the sequences. Single-aliquot and small aliquot analyses verified the mixing processes (Spencer *et al*. 2003), but have so far been unable to resolve the ages of the critical primary incision events or earliest fills. It was realised that realtime observations during fieldwork would have been extremely useful to direct sampling away from such mixed materials and thus minimise wasted effort in the laboratory.

So far three systems have been developed at SUERC to help with this. The first, put together early in 2005, was used for fieldwork in Thailand collecting sediments from the December 2004 Indian Ocean tsunami. This system (Fig. 10A2.1) provides for CW mode stimulation of IRSL (880nm) and OSL (470nm) from samples presented in 50mm diameter petri dishes through a drawer derived from the SUERC PPSL system for detection of irradiated foods. Luminescence is detected through UG11 filters, by an ETL photodetector module with 25mm diameter bi-alkali photomultiplier, integral HVgenerator, amplifier-discriminator, and RS232-output photoncounter. The system is powered by 4 NiMH batteries, or by a mains adapter. It weighs less than 5kg and can be transported in a compact field-case. Stimulation power was limited to 90mWof IR and approximately 25mW of blue radiation, giving a battery lifetime of 1–2 working days, with data logging to a laptop computer. A second set of batteries and external charger maintains continuous operability for extended fieldwork.

The detector-head and sample drawer system are separate from the control box, which contains waterproof battery holders and operating switchgear. In this design, deliberately kept simple, the operator switches stimulation sources off and on manually in conjunction with ETL-photon counting software. This gives complete control of the duration and sequence of stimulation and luminescence measurement. This reader has been used on more than 6 field projects, and also for teaching and laboratory demonstrations. It has established itself as a reliable and useful part of our laboratory equipment.

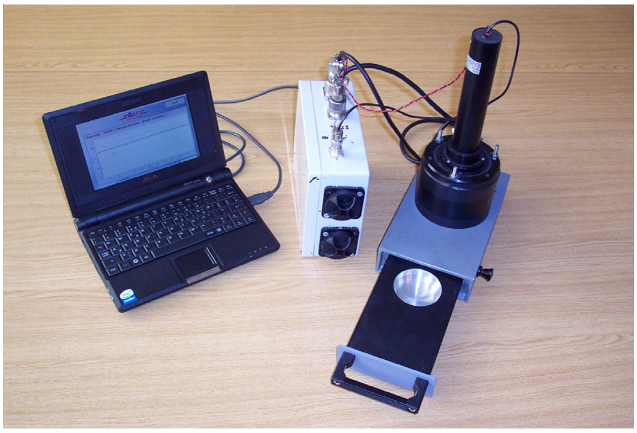

Fig. 10A2.1 The SUERC portable OSL unit

A second unit was configured in 2006; also based on a two-box design, but using a 30mm photodetector module generating a TTL pulse stream in photon counting mode. The stimulation collar and filtration arrangements remain as before, comprising 6 clustered diode ports with long-pass filters (RG780 filters for the IR diodes, and CG420 filters for the 470nm diodes), and detection through UG11 filters. Signal processing utilises a SUERC pulsed-PSL control board derived from our food irradiation instruments. This allows pulsed or CW stimulation control, includes a 24 bit photon counter, programmable for either unidirectional photon counting, or for synchronous lock-in up/down counting. In pulsed mode durations and spacing between pulses from 1 to 99ms can be selected. A USB port connects to the associated data logging and control computer. This system can reproduce the CW performance of the original unit, but can also work in synchronous pulsed mode to recover signals below the dark count rate of the instrument. It is intended to investigate pulse-duration variation to enhance quartz or feldspar derived signals from bulk sediments.

Currently a set of pulsed units is under construction, for use in Geography departments in Glasgow, Manchester-Metropolitan and Sheffield Universities. Consideration has been given to future incorporation of a heating system, and also to whether to add an X-ray tube (cf. Hashimoto *et al.* 2002; Thomsen *et al*. 2008). At present however our preference is to keep the units simple (in a similar manner to the systems recently described by Smetana *et al.* (2008) for UV dosimetry), avoiding sample pelletisation (cf. Poolton *et al.* 1994), and to assess the potential for delivering useful information in the simplest modes of field operation. So far sensitivity-calibration has been performed by gamma irradiating and remeasuring sample geometries after return to the laboratory, rather than by developing a portable irradiator.

APPLICATION TO CAVA PETRILLI

In 2006 work was undertaken at Cava Petrilli, in conjunction with the other investigations taking place at the site, with the aim of assessing the potential of the fragmentary features preserved there for luminescence dating.

Sections through the main enclosure ditch (F1 and F2) and the small enclosure ditch (F3) were investigated (Fig. 10A2.2). The lower fill of the main ditch has a markedly darker

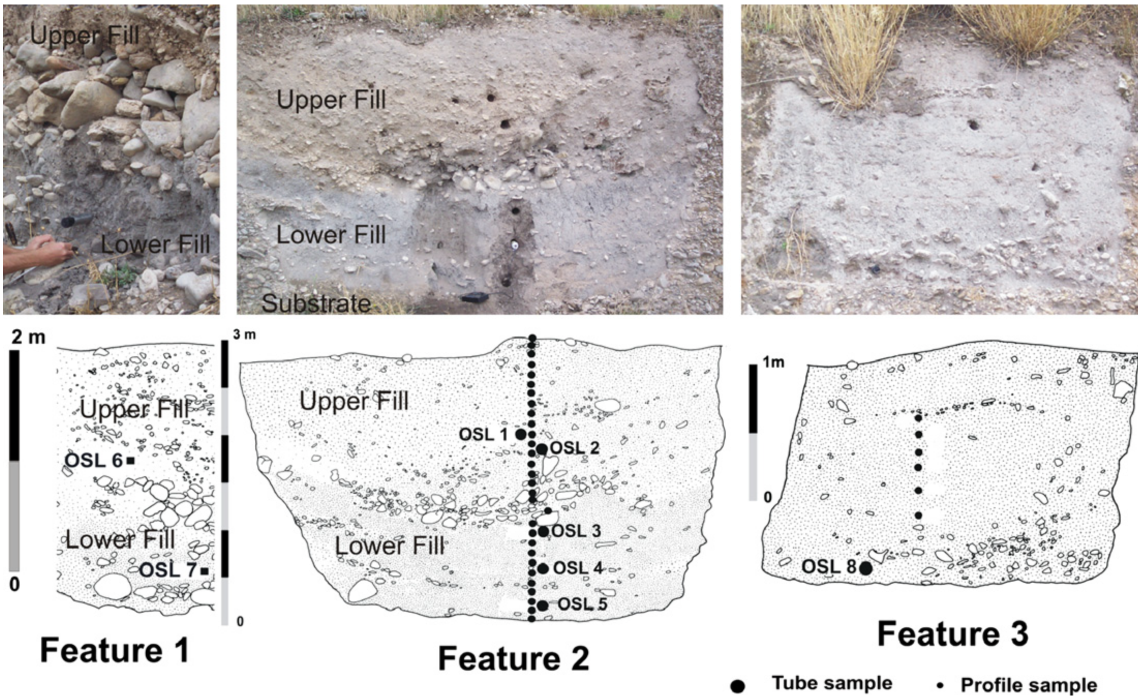

Fig. 10A2.2 Neolithic ditch fills at Cava Petrilli with OSL profiling and tubes sample positions shown. Features 1 and 2 are from the main enclosure ditch (c. 3m deep and 4m wide) exposed in the surviving quarry section. Both show lower (dark) and upper (lighter and stony) ditch fills, with upcast substrate material at top of section due to quarrying. Feature 3 shows the smaller square cut ditch outside the main enclosure

texture than the upper fill, suggestive of higher organic content, and potentially associated with the period of primary (agronomic) landscape use in the Neolithic. The upper fill is drier and more sterile, with a stony base, and potentially represents a post-abandonment fill.

Initial fieldwork on 17th September collected a small series of samples from the substrate and infill associated with F3, and upper and lower fill samples from the main ditch at F1. These samples were collected under temporary dark covers and transferred later the same day, again under cover, to the portable reader for CW IRSL and OSL measurement. The results in Table 10A2.1 verified the similarity of signal levels between the lower fills of feature F3 and the main ditch at F1. Substrate signals were more than one order of magnitude greater, reflecting the greater age of the regional sediments. But surprisingly so were the signal levels from the upper fill of the main enclosure ditch at F1.

Feature	Height in cm	IRSL	Depletion Index	OSL	Depletion Index
F3 Fill (28)	120	22086±149	1.36±0.02	44989±212	1.57±0.02
F3 Fill	108	21888±148	1.37±0.02	57067±239	1.54±0.01
F3 Fill	95	19174±138	1.38±0.02	46441±216	1.54±0.01
F3 Fill	84	13486±116	1.33±0.02	36755±192	1.57±0.02
F3 Fill	62	15412±124	1.36±0.02	38398±196	1.52±0.02
F3 Fill (32)	50	14781±122	1.32±0.02	37358±193	1.48±0.02
F3 Fill (35)	10	13803±117	1.32±0.02	27108±165	1.37±0.02
F3 Substrate	<0	432392±658	1.37±0.01	494111±703	1.31±0.01
F1 Upper fill (16)	117	118040±344	1.36±0.01	201825±449	1.33±0.01
F1 Lower fill (12)	10	9814±99	1.3±0.02	29010±170	1.48±0.02

Table 10A2.1 Initial observations from features F1 and F3 at Cava Petrilli 17th September 2006. Note the contrast between the substrate signal levels and infills in Feature 3; reflecting the difference between regional sediments and archaeological fills of presumed Neolithic Age. Similar signals are observed in Feature F1, but note the inversion between lower and upper fills

To investigate this further, the full 3m section of the main ditch at F2 was sampled the following day. 30 samples were collected at 10cm intervals from the base of the ditch infill, together with small samples for laboratory profiling. Full size tubes were also collected from 8 positions in all features, together with in-situ gamma spectra, to permit SAR OSL dating so that the relationship between field profiling, laboratory profiling and OSL dating could be examined. Again the portable OSL reader was used to record the full profile later that day. The intensity data shown in Fig. 10A2.3, confirmed the markedly inverted luminescence stratigraphy, and suggested the depositional explanation for it. Depletion ratios were generally consistent across the section, suggesting that variations in clast content and sediment colour were of secondary importance to luminescence sensitivity. Starting from the base the lower (dark) fills have relatively consistent signal levels, and similar IRSL/OSL ratios to those observed in the fill of F3. Substrate intensities, observed here at top of section as a result of quarrying, also match those beneath FF3, and are an order of magnitude higher than the archaeological fills.

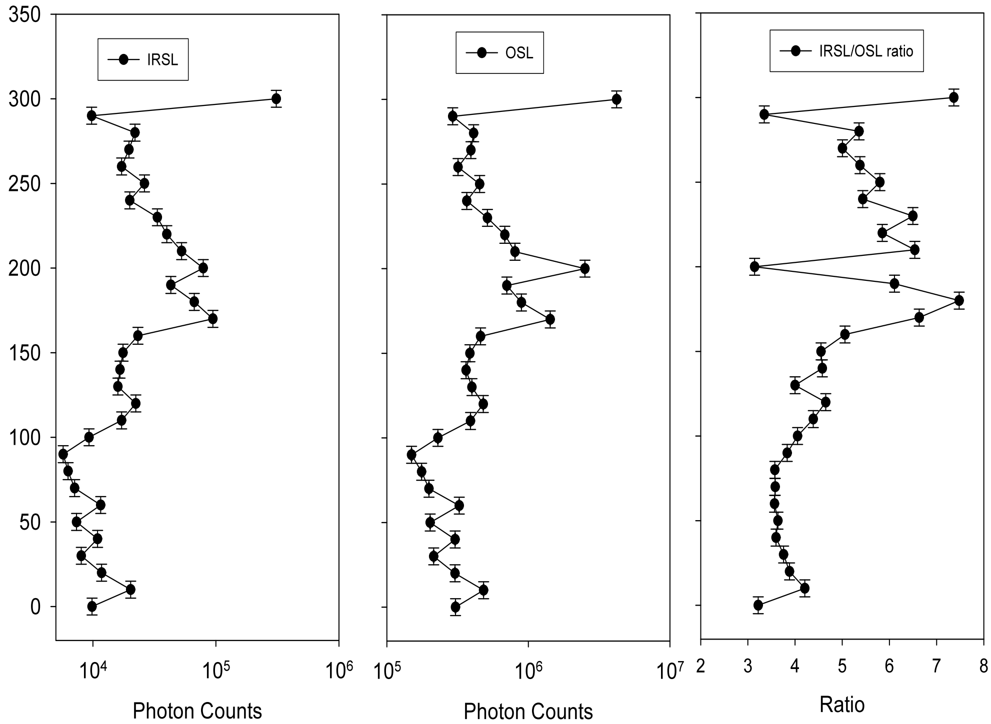

Fig. 10A2.3 Detailed profiles of IRSL, OSL and IRSL/OSL ratio for Cava Petrilli feature F2. The lower fill occupies the bottom 100cm, followed by a stony interface at 110-130cm then the upper, dry, fill. The top sample represents upcast substrate material re-deposited by recent quarrying

The striking feature of this profile is that, as also observed from Feature F1, the upper fills show near-substrate signal levels, which are an order of magnitude higher than those from the archaeological material underneath them. They also show inverted and peaked intensity distributions. Logically the only viable source for such sediment in the archaeological period, would be from material originally held in the banks of the enclosure (thus derived from the substrate at time of incision of the ditch) being redeposited on top of the lower ditch infill after the period of initial use of the monument. Whether this final reworking was the result of human activity or natural post-abandonment processes is unclear; although it is notable that the stony layer that initiates the sedimentary break carries lower signal residuals than the material that follows. This suggests that the redeposition took place rapidly, without resetting bulk luminescence. The implications for dating are that the upper layer represents redeposited material from which mixed-ages and/or excess residuals may be expected. The other important implication is that the luminescence profiles provide evidence for the existence in the past of a banked enclosure, whose banks have long since

ceased to exist, and may have thus been overlooked. Another notable feature of the field profiles was the systematically higher IRSL/OSL ratio in the upper fill relative to the basal fill. The possibilities that the ratio acts as proxy for the relative contributions of feldspars and quartz, and that the lower fills might have experienced greater weathering history (both in the pre-archaeological environment and during the active agronomic period) were also noted in the field.

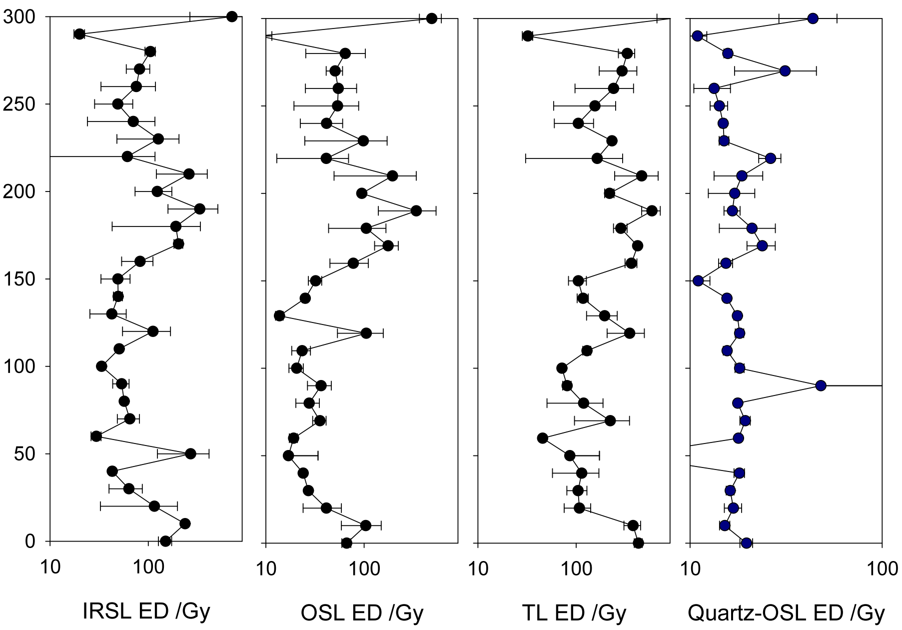

Fig. 10A2.4 Laboratory profiling results from Cava Petrilli feature F2. IRSL, OSL and TL equivalent doses were determined from 90 to 150μm acid treated polymineral grains; the quartz-OSL profile from HF and density separated grains

The interpretation of the field profiles in terms of depositional age and redepositional processes depends on the extent to which co-factors of luminescence sensitivity and dosimetry influence the outcome. It was decided to assess these, and mineralogical hypothesis to explain the IRSL/OSL ratios in the laboratory. Sieved polymineral and quartz extracts were prepared from pairs of samples from each of the 30 profile positions and subject to rapid equivalent dose determinations using a Risoe DA 15 TL/OSL reader. These are shown in Fig. 10A2.4. Horizontal error bars represent the range of replicate samples.

Despite greater geo-statistical sub-sampling variations than shown by the field measurements, the main features of the field profile are reproduced in these sensitivity-calibrated data, particularly from the polymineral extracts.

K, U and Th contents were also determined by high resolution gamma spectrometry for each of the 30 samples; weighted combination of the gamma ray lines from the U and Th decay series being used to estimate parent concentrations. These are shown in Fig. 10A2.5. It is apparent that only subtle radiometric variations and gradients are observed through the section. Apart from a suggestion of marginally lower uranium and thorium concentrations in the lower fill, which might reflect a greater organic content, the data are essentially uniform and cannot account for the order of magnitude changes in luminescence signals. Work was also conducted to examine the mineralogy by a combination of x-ray diffraction and SEM-x-ray analysis. This verified the presence of calcite, quartz and potassium feldspars as the main mineral components of the sediments and produced tentative evidence (again within relatively large geo-statistical scatter) of aluminium and potassium enrichment in the upper fill layers. Overall therefore laboratory analysis of the profiling samples corroborated the initial field interpretation of the profile in terms of depositional history. The implication is that the lower fills are more likely to yield meaningful OSL dates, than the upper fills. To check this a series of Quartz-SAR dates were also determined from the tube samples.

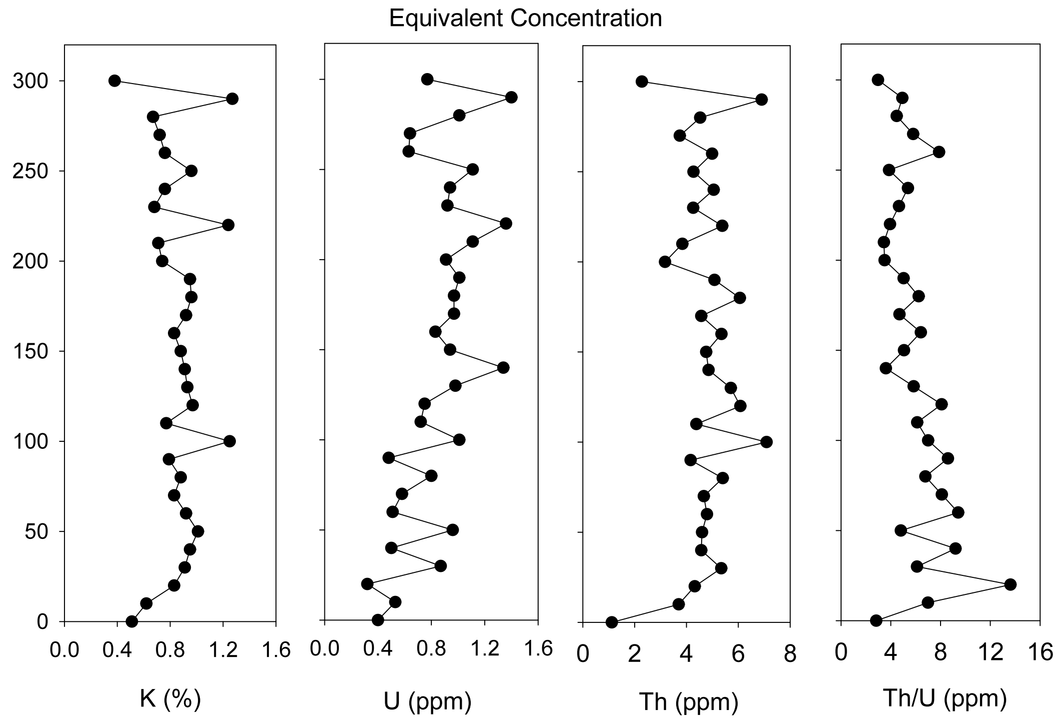

Fig. 10A2.5 Natural radioelement concentrations from Cava Petrilli Feature 2, determined by high resolution gamma spectrometry (50% relative efficiency n-type HPGe detector) relative to an internal Shap Granite standard.

The SAR analysis followed the same established procedures as other similar work from the laboratory (e.g. Sanderson *et al.* 2007). Equivalent dose determinations, accompanied by pre-heat plateaux, zero cycle, IR sensitivity and recycling ratio tests were made for 16 aliquots per sample, and dose rates evaluated on the basis of a combination of in-situ gamma spectrometry, thick source beta counting and high resolution gamma spectrometry. The dates obtained, derived from all aliquots which satisfied SAR acceptance criteria without attempting to trim dose distributions, are shown in Table 10A2.2. It can be seen that the

Field no.	SUTL no.	Features and context	Height in cm	Date BC with error
OSL 1	2139	F2 Upper fill	197	6980±600
OSL 2	2140	F2 Upper fill	168	7970±620
OSL 3	2141	F2 Lower fill	89	5790±780
OSL 4	2142	F2 Lower fill	55	6320±410
OSL 5	2143	F2 Lower fill	14	5830±720
OSL 6	2144	F1 Upper fill	117	10620±960
OSL 7	2145	F1 Lower fill	10	5790±530
OSL 8	2146	F1 Lower fill	10	6940±570

Table 10A2.2 Quartz SAR dating results from tube samples at Cava Petrilli. Samples OSL 1 and 2 come from the upper fill of F2, and associate with OSL 6 from F1. Lower fill samples from F2 are OSL34 and 5, which associate with OSL 7 in F1

lower fill layers (samples OSL 3,4,5 and 7) correspond to late 7th millennium and early 6th millennium BC ages. Radiocarbon dates (see Appendix 3) from cattle bone recovered from well up in the upper fill come from material from the 6th millenium BC; arguably slightly younger than the basal OSL dates but not discordant. By contrast the OSL dates from the upper layers show excess ages of several ka compared with the radiocarbon dates and with the sequence implied by the OSL results from the lower fill. While it might be interesting to conduct further dose-determinations, possibly with smaller aliquots or single grains, to attempt to disentangle the mixtures, these analyses clearly confirm the difficulties

associated with dating the redeposited material from the upper layers. By contrast the lower layers are better suited to OSL dating, producing results that are in broad agreement with the independent radiocarbon chronology.

DISCUSSION AND CONCLUSIONS

In the Cava Petrilli features, the major variations were due to redeposition of bank-derived material containing significant residuals from the regional substrate within the archaeological fills. These were identified using simple field screening measurements, and confirmed by subsequent laboratory work. The evidence of excess ages of several ka in SAR OSL dates from the upper layers of the Tavoliere ditches also confirms the value of field profiling in identifying mixed-age material at an early stage.

Chapter 10 Appendix 3:

Radiocarbon Dates from Cava Petrilli

Radiocarbon Dates from Cava Petrilli

Ruth Whitehouse

Two radiocarbon dates were obtained from animal bone samples from the two different exposed sections of the enclosure ditch, F1 and F2.

1) SUERC-4536 (GU-12472)
F2, layer 4. Cattle/ horse (almost certainly cattle) thoracic vertebra.

6415±35 BP 1σ 5468–5364 cal. BC 2σ 5471–5326 cal. BC (CALIB 5.0.1)

2) SUERC-4535 (GU-12471)
F1, layer 12. Cattle radius.

6180±35 BP 1σ 5210–5069 cal. BC 2σ 5222–5016 cal. BC (CALIB 5.0.1)

Both samples come from grey silt layers, the earlier date coming, as one would expect, from a lower level than the later one (Table 10.1). These silt layers are interpreted as fill generated by anthropogenic sources derived from cereal processing and/or the burning of stock stabling waste and deposited slowly; they pre-date the phase of deliberate backfill represented by a series of stony layers.

There are three main points to be made about these dates. First, there is an approximately 300-year gap between the dates, which do not overlap even at the 2σ level. This suggests that the ditch, or parts of it at least, was open for several centuries before being backfilled.

Second, both dates fall within the later part of the documented Neolithic occupation of the Tavoliere. If we compare them with dates from other ditched enclosures (Chapter 2, Fig. 2.7), we see that there are only two comparably late dates: one from Masseria Candelaro and one from Passo di Corvo (both of these have large margins of error and are therefore very imprecise). These relatively late dates are in accord with the typology of the potsherds found: very little Impressed ware, predominance of plain burnished ware, occurrence of red-painted *figulina* ware of Passo di Corvo type (see Appendix 10.4).

Third, if we compare the ^{14}C dates with the OSL dates (Appendix 10.2, Table 10A2.2), we see that the ^{14}C dates are later than the OSL dates, by up to a millennium. There are several reasons for accepting the ^{14}C chronology:

a) the ^{14}C dates have much smaller margins of error than the OSL dates and are therefore inherently more precise

b) the ^{14}C dates are derived from animal bone, which relate directly to the occupation of the settlement (specifically the date of death of the animal). By contrast, the OSL dates, which are derived from soils/sediments, could reflect earlier material incorporated into the fill. Of course, animal bone could also be incorporated from earlier deposits, but at least we can be sure that the date relates to a period when the site was being used by people who bred cattle, so probably to the known settlement.

c) The ^{14}C dates are consistent with dates from other sites with comparable pottery, particularly Passo di Corvo, where a ^{14}C date of 6140±120 BP (1σ 5210–5070, 2σ 5224–5016 came from a pit in area a, assigned by Tiné to his phase IVa2, characterised by classic Passo di Corvo painted ware and a predominance of plain burnished ware (Tiné 1983: 163), very similar to the profile of the pottery from Cava Petrilli.

Chapter 10 Appendix 4:

Pottery from Cava Petrilli

Pottery from Cava Petrilli

Sue Hamilton & Ruth Whitehouse

Eighty-five pottery sherds were examined, 45 from stratified layers within the features examined, another 40 unstratified, found in the vicinity of the features (Table 10A4.1).

Seven different fabric types were identified, four coarse, one medium and two fine. The characteristics of the wares are tabulated in Table 10A4.2. The commonest type, constituting well over half of all the pottery (57 sherds), was the medium ware (e.g. sherds 6, 10 and 21: Figs 10A4.1 and 10A4.2). These sherds come from open vessels, with walls of medium thickness (7–12mm) and include both rounded and carinated forms. Surfaces vary in colour from buff to dark grey and black and often have highly burnished surfaces, many with clear stroke marks. One sherd has a protruding boss with incised lines on either side (sherd 6, Fig. 10A4.1), but no other decoration appears on medium ware sherds. One sherd (not illustrated) has a 'rivet' hole made post-firing.

The combined count of the different coarse ware sherds is 16. They come from thicker-walled vessels, (c.12–30mm). Surfaces vary from orange to dark grey in colour, and are usually lightly burnished. Three sherds have decoration of impressed type, one of coarse ware 1 (sherd 20: Fig. 10A4.2) and two of coarse ware 2 (sherds 7 and 14: Fig. 10A4.1). One coarse ware 3 sherd is a simple ring handle (sherd 19: Fig. 10A4.1).

The fine ware sherds number 12, 10 of fine ware 1, 1 of fine ware 2 and 1 that could be either. These fine wares are of the type generally called *figulina*, with a buff to orange fabric, sometimes a light-coloured slip, and highly burnished surfaces. The sherds come from thin-walled vessels (4–8mm) of mostly open form and four are decorated with bands of red paint, (the class of pottery usually called 'Passo di Corvo ware', following the scheme developed by Santo Tiné) (sherds 9, 11 and 16: Figs 10A4.1 and 10A4.2). Sherd 9 has a 'rivet' hole made post firing (Fig. 10A4.1).

The petrographic analysis of seven sherds (Appendix 10.5) includes coarse ware sherds from F1 (sherd 7: Fig. 10A4.1) and F2 (sherd 19: Fig. 10A4.2) and *figulina* sherd (Passo di Corvo ware) from F2 (sherd 16: Fig. 10A4.2).

The small number of Impressed ware sherds and the significant presence of *figulina* ware, and specifically Passo di Corvo ware, support the evidence of the radiocarbon dates (see Appendix 10.3), which indicate that the occupation of Cava Petrilli falls within the later part of the documented Neolithic occupation of the Tavoliere.

Feature/ layer		Fill group	Fabric						
			CW1	*CW2*	*CW3*	*CW4*	*MW*	*FW1*	*FW2*
			Number of sherds						
F1	15	upper						1	
	16						2		
	12	lower	1	2			10		
	US	N/A	4	1			22	8	1
F2	8/ 9 interface	upper					1		
	8					1			
	7			1					
	40						1	1	
	4	lower		1			8		
	3		1						
	2				1		3	1	
	US	N/A					2		
F3	32	N/A					1		
	32/ 35 interface			1					
	US			1	1				
F4	grouped	N/A					7		

Table 10A4.1 Pottery fabrics at Cava Petrilli by feature and layer

Grade	Fabric grade	Paste	Thickness in mm	Firing/ surface treatment	Other	Key vessels
Coarse	*CW1*	Rare to moderate, angular and sub-angular coarse sand to small pebble-sized (3–8mm) *crosta* and rare angular sand-size (*c*. 1mm) chert. Cubey fracture.	12–25mm	Oxidised orange surfaces with dark brown unoxidized cores. Lightly burnished inside and out. Occasional sherds oxidised throughout.		1, 20
	CW2	Silty with abundant unidentified fine mineral sand (0.25–0.5mm) with occasional mica. Some carbonaceous material. Cubey fracture.	25–30mm	Oxidised orange to unoxidized dark brown surfaces with dark grey unoxidized cores. Lightly burnished inside and out.	Evidence for coil-building.	7, 14, 15 and 22
	CW3	Silty with abundant unidentified fine to medium mineral sand (*c*. 0.5mm) and sparse angular chert/ quartz. More homogeneous fracture than *CW1* & *CW2*.	*c*. 14mm	Oxidized throughout. Lightly burnished inside and out.		19
	CW4	Abundant shell (1–6mm), including fragments of bivalves and gastropods, with rare small pebble-size (9mm) grog and coarse sand-sized (3mm) crosta.	22mm	Patchy oxidised orange to unoxidized dark grey interior and exterior surfaces. Evidence for light burnishing inside and out.		
Medium	*MW*	Abundant rounded, fine to medium, transparent quartz sand (*c*. 0.5mm). Even fracture.	7–8mm/ 12mm	Oxidised buff to unoxidized black surfaces with (mostly) unoxidized cores. Distinct oxidized outer margins up to 1.5mm thick. Possible slips. Highly burnished surfaces, often with clear stoke marks.	Carinated vessels. Body sherd with post firing 'rivet' hole.	3, 5, 6, 10, 12, 13,17,18 and 21

Table 10A4.2 Neolithic pottery fabrics at Cava Petrilli

Fine	*FW 1*	Rare very fine, white sand (0.5mm). Probably levigated	4–8mm	Oxidized orange/ buff throughout. Highly burnished. Painted with fine brush strokes	Post firing 'rivet' hole.	1, 2, 8, 9, 11 and 16
	FW2	Sparse to moderate fine, white sand (0.5mm)	7mm	Oxidized orange/ buff throughout. Highly burnished. Single body sherd with white/ pale buff slip on outer surface.		
Inclusion density and grain size classifications after PPRG 1991, 35						

Table 10A4.2 cont. Neolithic pottery fabrics at Cava Petrilli

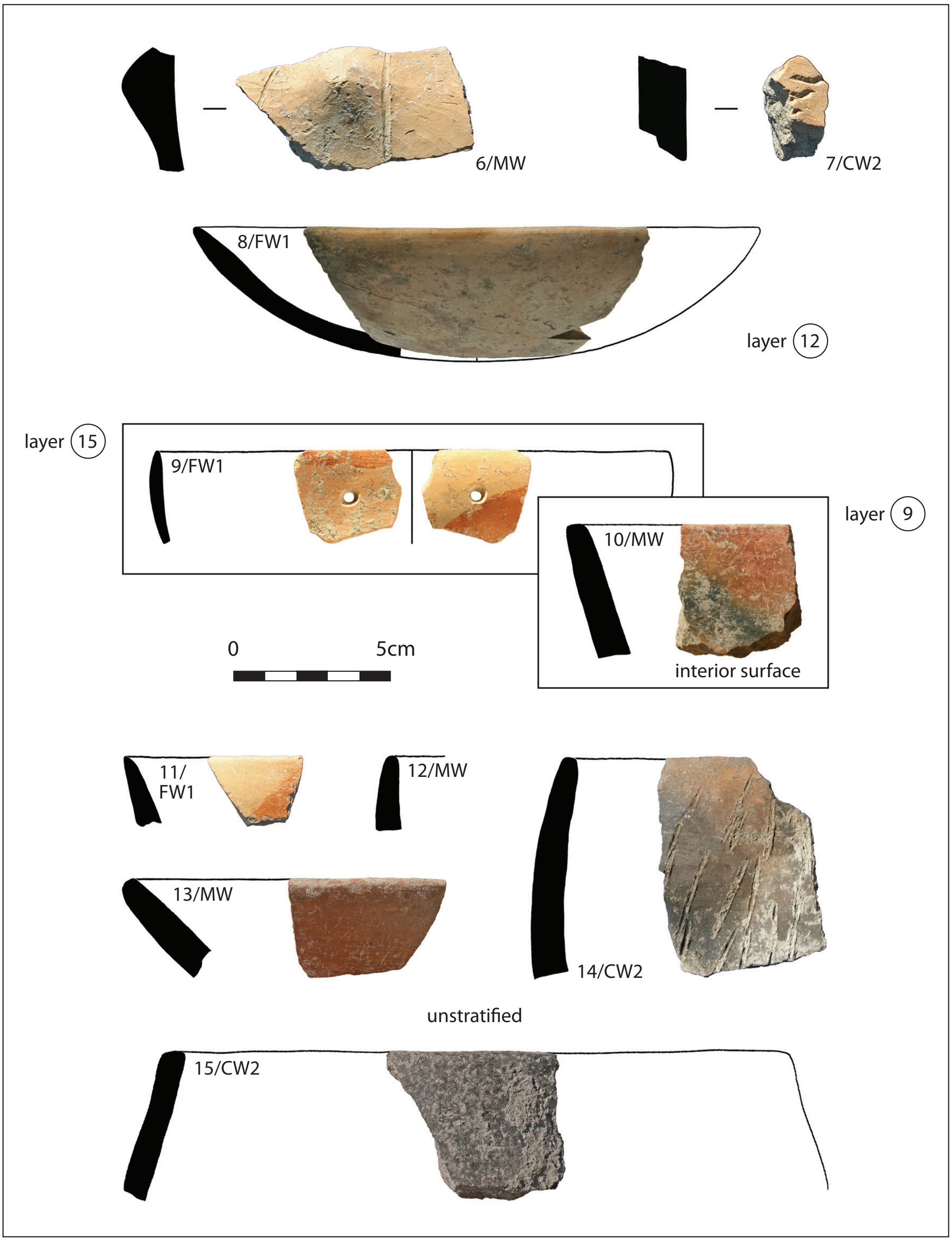

Fig 10A4.1 Neolithic pottery from the main enclosure ditch (F1) at Cava Petrilli

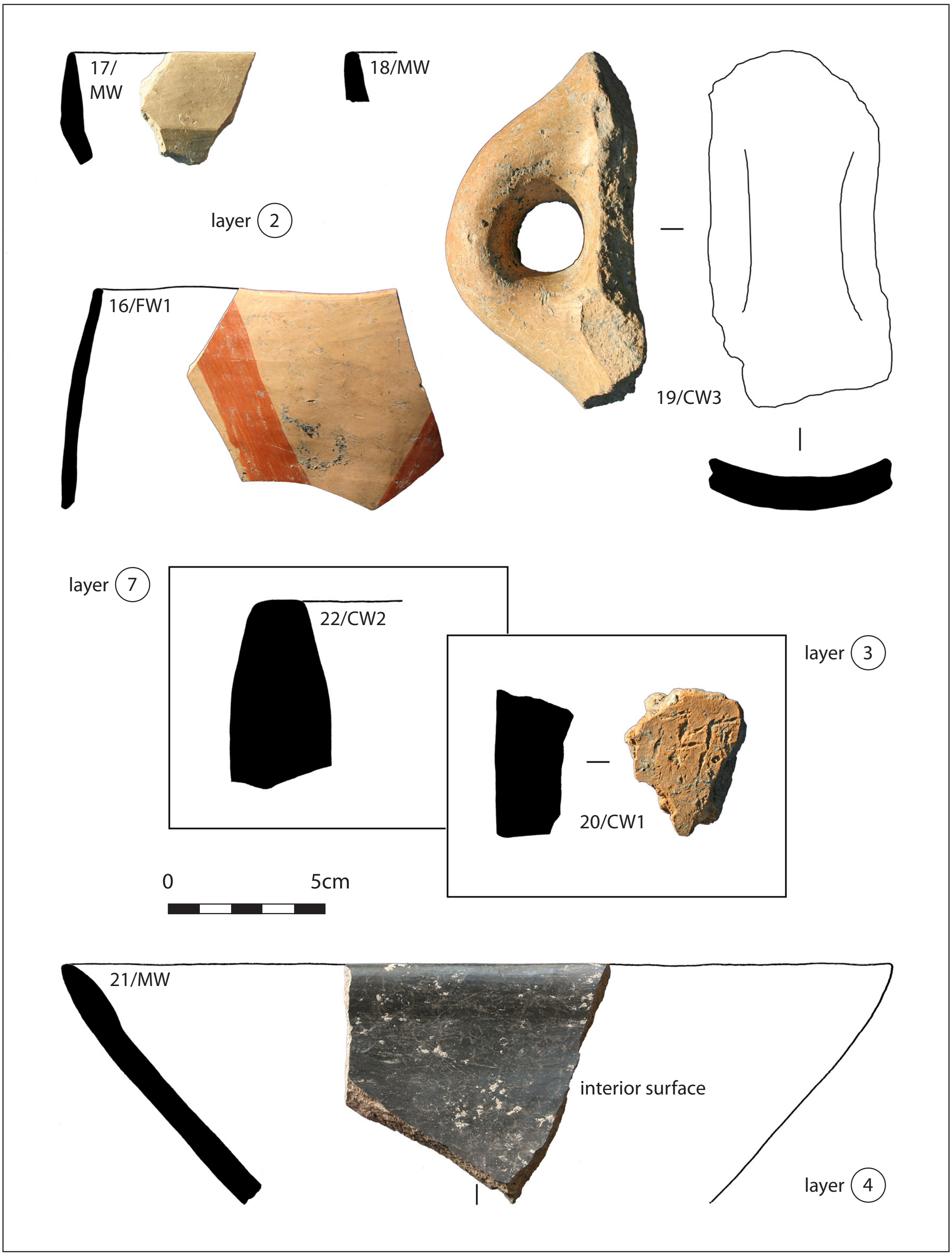

Fig 10A4.2 Neolithic pottery from the main enclosure ditch (F2) at Cava Petrilli

Chapter 10 Appendix 5:

Scientific Examination of Potsherds

Scientific Investigation of Impressed Ware Potsherds and a *Figulina* Ware Sherd from Cava Petrilli (FG)

Michela Spataro

To investigate the *chaîne operatoire* of the Impressed ware and *figulina* ceramics at Cava Patrilli, seven potsherds (six from everyday ceramics and one *figulina* ware (Figs 10A5.1; Table 10A5.1) from two sections through the main enclosure ditch of the ditched village of Cava Petrilli were analysed in minero-petrographic thin section and by Scanning Electron Microscopy used in combination with Energy Dispersive Spectrometry (SEM–EDS).

MINERO-PETROGRAPHIC ANALYSIS

A Leica polarised microscope DLMP was used for the study of the thin sections. Six fabrics were defined. In contrast to the fine paste of the *figulina* sherd, the everyday ceramics have a coarse fabric.

Group 1 – (sample CPT1, figulina) (Figs 10A5.2 and 10A5.3)

Brown-reddish, slightly isotropic, calcareous, ferruginous, micaceous and slightly fossiliferous fabric, with abundant and fine well-sorted sub-angular and angular quartz (10%; typical size 0.02 x 0.02mm), some muscovite with fine lamellae (>2%), occasional pyroxene, feldspar, occasional polycrystalline quartz, very occasional amphibole, fine calcareous pellets (3%), occasional microfossils (Foraminifera, possibly gastropods: Adams & Mackenzie, 1998: 45), abundant iron oxides (>3%), and occasional opaques. A red slip (Fig. 10A5.4) and some post-depositional carbonates are visible along one surface of the sample.

Group 2 – (sample CPT5) (Figs 10A5.4 and 10A5.5)

Brown, reddish along one surface, calcareous and fossiliferous fabric, with mainly well-sorted sub-angular and angular quartz (15%; typical size 0.03 x 0.03mm), abundant coarse shell fragments (10%; up to 2.0 x 0.3mm; occasionally with foliated layers), occasional polycrystalline quartz, chert, plagioclase, elongated metamorphic quartz, occasional muscovite mica, pyroxene, feldspar, and amphibole, some opaques, very occasional fragments of calcareous sandstone, clay pellets, occasional iron oxides, radiolarian chert and microfossils (Foraminifera, such as gastropods), some micritic mainly sub-rounded limestone fragments (>3%; some of which is iron-stained, and one fragment is oolitic). The shells have been identified as bivalves, possibly *Cerastoderma edule* (M. Mannino pers. comm. 2006).

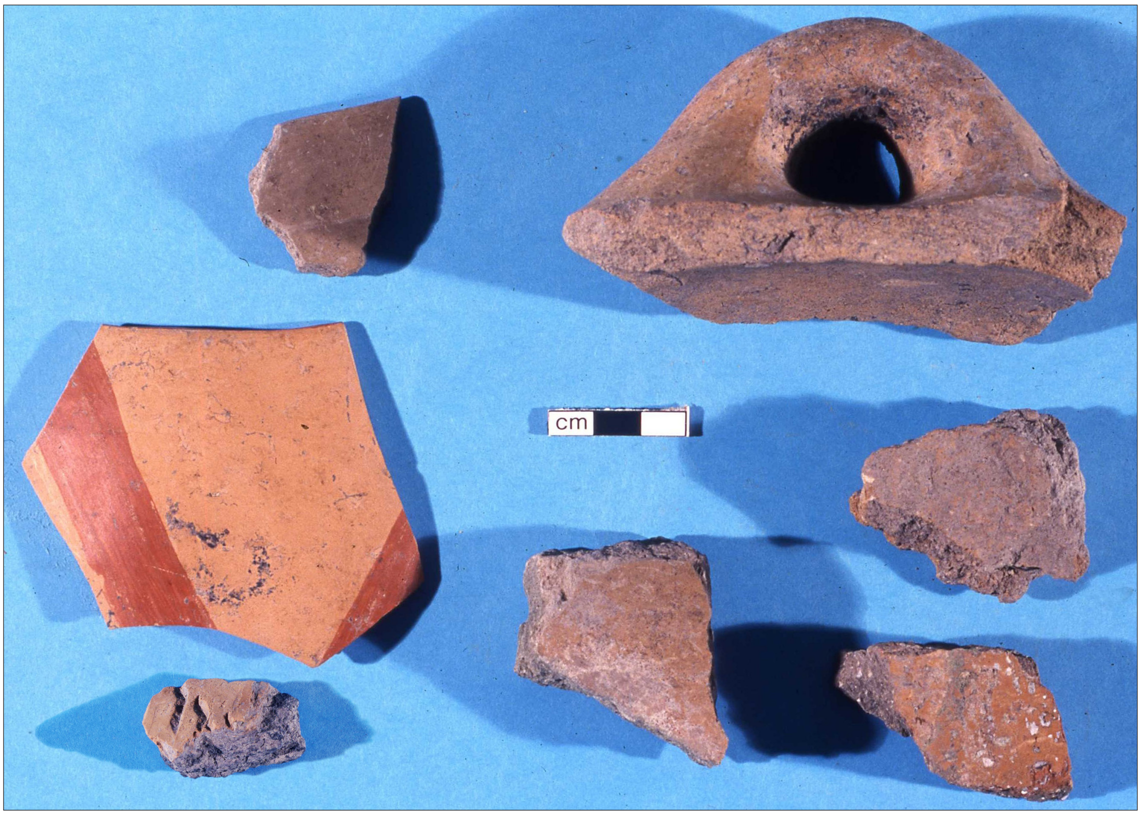

Fig. 10A5.1 Cava Petrilli: everyday potsherds and *figulina* ware discussed in the text

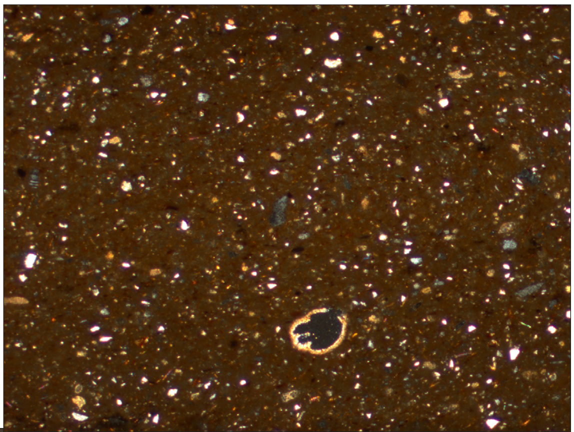

Fig. 10A5.2 Microphotograph of sample CPT1 (*figulina* ware, fabric group 1) showing a slightly vitrified fabric, with very well-sorted and fine inclusions, such as quartz, muscovite mica, feldspar and a microfossil (cross polarised light [XPL], field width 3.5mm)

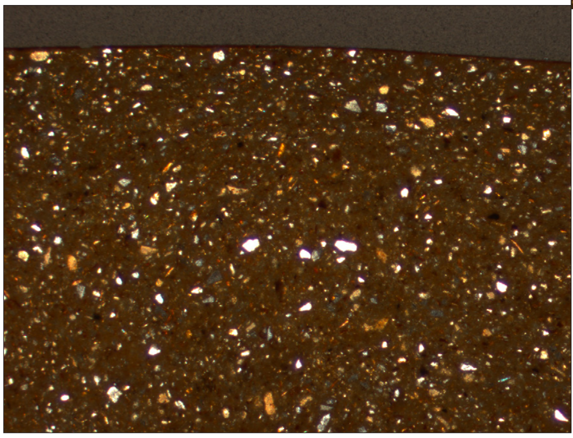

Fig. 10A5.3 Microphotograph of sample CPT1 (*figulina* ware, fabric group 1) showing a slightly vitrified fabric, as Fig. 10A5.1, with a thin red painted layer along the surface of the potsherd (XPL, field width 3.5mm)

Sample	Appx 4 sherd no	Description	Context	Appx 4 macroscopic fabric	Munsell Colour	Fig. no
CPT1	16	very fine rim of a *figulina* bowl with thick red painted bands	F2, layer 2	FW1 (*figulina*)	7.5 YR 7/4 pink	10A4.2, 10A5.1
CPT2	7	very small body fragment with impressions	F1, layer 12	CW2	10YR 7/3 very pale brown	10A4.1
CPT3	none	body sherd	F2, layer 4	CW2	10YR 7/3 very pale brown	10A5.1
CPT4	19	very coarse and thick handle	F2, layer 2	CW3	10YR 7/3 very pale brown	10A4.2, 10A5.1
CPT5	none	coarse small fragment	F2, layer 8	CW4	7.5YR 6/4 light brown	10A5.1
CPT6	none	very thick body fragment	F2, layer 3	CW1	10YR 7/3 very pale brown	10A5.1
CPT7	17	small rim sherd	F2, layer 2	MW	7.5 YR 8/2 pinkish white	10A4.2, 10A5.1

Table 10A5.1 Cava Petrilli: everyday potsherds and *figulina* ware discussed in the text

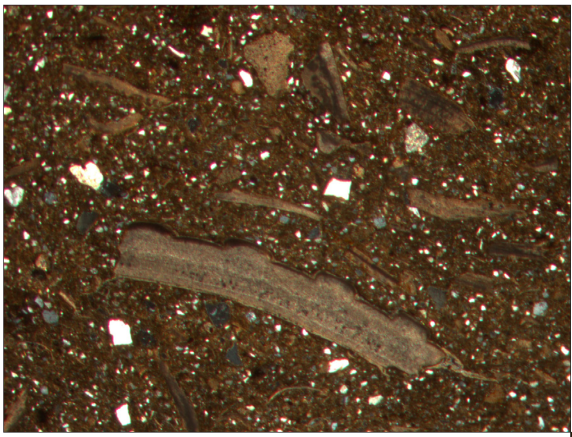

Fig. 10A5.4 Microphotograph of sample CPT5 (fabric group 2) showing a bi-refringent (non-vitrified) and coarse fabric, with well-sorted quartz and abundant shell fragments (a foliated layer is visible in the coarse shell fragment) (XPL, field width 5.4mm)

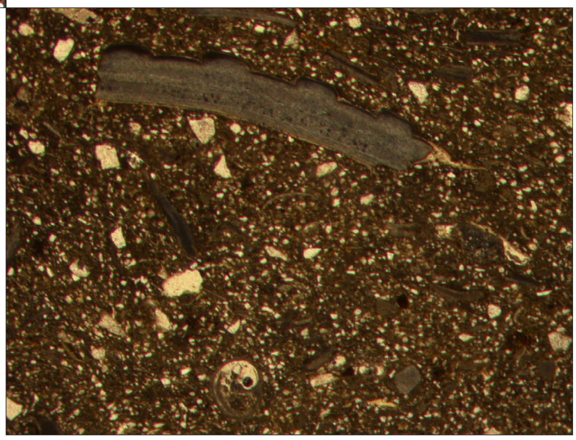

Fig. 10A5.5 Microphotograph of sample CPT5 (fabric group 2) showing a similar area to that of Fig. 10A4.4 but in plain light, which allows us to see the foraminifera in the paste of the potsherd at the bottom of the image (plane polarised light [PPL], field width 5.4mm)

Group 3 – (sample CPT6) (Fig. 10A5.6)

Brown, red on an edge and very slightly calcareous fabric, with poorly-sorted sub-angular quartz (<20%; typical size 0.04 x 0.04mm; occasional coarser grains), occasional chert, polycrystalline quartz, occasional voids left by the burning of organic matter, some plagioclase and feldspar (some of which is fresh), some muscovite mica (2%), pyroxene, amphibole (>1%), very rare opaques, some clay pellets, abundant rounded and sub-rounded coarse micritic limestone fragments (>7%; up to 14 x 10mm), occasional and fine igneous inclusions (lava?), occasional shell fragments, and some iron oxides.

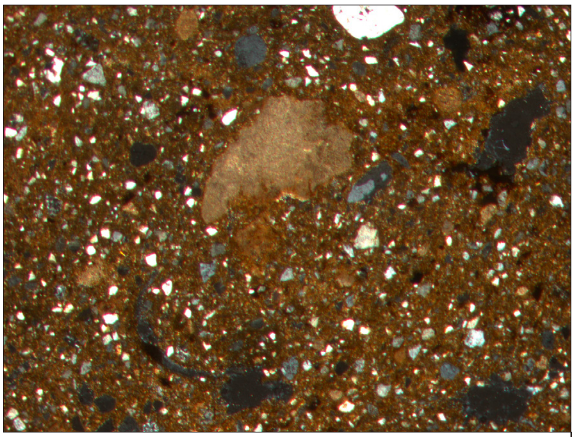

Fig. 10A5.6 Microphotograph of sample CPT6 (fabric group 3) showing a bi-refringent fabric, with well-sorted quartz (occasionally some coarser grains), sub-rounded calcareous fragments and occasional voids left by the burning out of organics (see lower part of the image) (XPL, field width 5.4mm

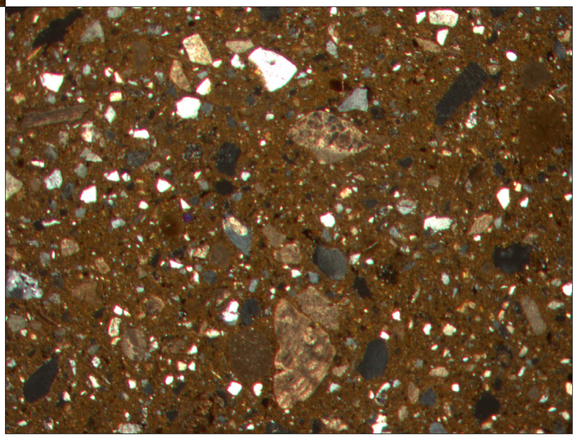

Fig. 10A5.7 Microphotograph of sample CPT4 (fabric group 3, *subgroup a*) showing a bi-refringent fabric, with quartz, some shell fragments and limestone (some of which is fossiliferous, see above) (XPL, field width 5.4mm)

Subgroup a – (sample CPT4) (Fig. 10A5.7)

Light brown, calacreous and fossiliferous fabric, with well-sorted mainly sub-angular quartz (15%; typical size 0.04 x 0.03mm; with some sparse coarser grains), occasional polycrystalline quartz, fresh feldspar (2%), plagioclase, occasional pyroxene and calcareous sandstone fragments, microfossils (gastropods), some shell fragments (brachiopods), occasional chert, rare very fine muscovite mica, abundant opaques, weathered igneous inclusions, rare amphibole, and some micritic sub-rounded limestone, of which some is fossiliferous.

Group 4 – (sample CPT7)

Brown, slightly calcareous, micaceous and fossiliferous fabric, with well-sorted sub-angular and angular quartz (20%; typical size 0.04 x 0.03 mm), rare shell fragments, some micritic sub-rounded fragments of limestone, some fresh feldspar, occasional microfossils (gastropods?), rare igneous inclusions, and occasional fine lamellae of muscovite mica. This sample is similar to CPT5 but it was not tempered with shells.

Group 5 – (sample CPT2)

Brown, lighter on an edge, slightly fossiliferous, abundant sub-angular and angular quartz (>10%; typical size 0.04 x 0.03mm), occasional polycrystalline quartz, occasional chert, abundant elongated voids left by the burning of organic matter (some of which is incompletely burnt), some soil pellets, some shell fragments, some red clay fragments, some pyroxene, opaques, very occasional rock fragments (calcareous sandstone?), some clay pellets, chert, occasional pyroxene, iron oxides, abundant limestone fragments, and occasional microfossils.

Group 6 – (sample CPT3)

Brownish-red, lighter on the edges, calcareous, iron-rich and fossiliferous fabric, with abundant sub-angular and angular quartz (15%; typical size 0.05 x 0.04mm), some plagioclase, occasional chert, abundant microfossils (Foraminifera: gastropods and possibly nummulites), some elongated voids, some mudstone fragments, shell fragments, clay pellets, red clay fragments, some opaques and iron oxides, and occasional igneous inclusions.

The fabric of the *figulina* ware is much finer than those of the everyday Impressed ware ceramics. It has a calcareous and micaceous paste with fine inclusions, such as quartz, calcareous pellets, muscovite, pyroxene, polycrystalline quartz, iron oxides, and occasional microfossils (Figs 10A5.2 and 10A5.3).

The everyday pottery shows some variability in fabrics, and it was subdivided into five petrographic groups. The fact that the coarse ware was made using a variety of fabrics, may reflect the work of multiple potters, possibly making the ceramics for their own household; it was likely to be a seasonal activity, with no need for craft specialists or evidence of production for a market (see discussion in Spataro 2019: 380–3). The fabric variety might also reflect different moments of production at the site. They are coarse, mainly calcareous and fossiliferous, with calcareous pellets, different percentages of shell fragments, and – in some cases – rock fragments, such as igneous inclusions, sandstone, and mudstone.

Group 2 shows abundant shell and coarse limestone fragments, occasional muscovite, polycrystalline quartz, pyroxene, feldspar, amphibole, radiolarian chert, very occasional calcareous sandstone fragments, and microfossils (Figs 10A5.4 and 10A5.5).

Group 3 has poorly-sorted quartz grains, limestone fragments, plagioclase, feldspar, muscovite, pyroxene, amphibole, occasional shell fragments, igneous inclusions, chert, polycrystalline quartz, and voids left by the burning of organic matter (Fig. 10A5.6). In contrast to Group 2, Group 3 (sample CPT6) has fewer shells and is not fossiliferous, and it contains abundant chert, feldspar and amphibole and occasional fine igneous inclusions, which are absent in Group 2. Group 3, *subgroup a* (sample CPT 4), has abundant fresh feldspar, shell fragments, and coarser quartz inclusions than Group 3. It is also fossiliferous, but it contains the same fresh feldspar, igneous inclusions, and amphibole (Fig. 10A5.7).

Group 4 has abundant quartz inclusions, fresh feldspar, some micritic limestone fragments, igneous inclusions, occasional shell fragments, and microfossils.

Group 5 has abundant voids left by the burning of vegetal matter, soil pellets, shell fragments, pyroxene, limestone fragments, calcareous sandstone (?), and occasional microfossils.

Finally, Group 6 has abundant quartz, some microfossils, plagioclase, chert, elongated voids left by organics, occasional igneous inclusions, and some mudstone fragments.

The fabric of the *figulina* sherd is typical of the Neolithic *figulina* ware production previously studied from the Adriatic coastlines (Spataro 2002, chapter 5: 179–91; Spataro 2009). It is well-fired and made using specific clay: fossiliferous, calcareous, micaceous and slightly iron-rich, with well-sorted and fine inclusions (mainly quartz, feldspar, muscovite, and, in some cases, chert).

Compared to the *figulina* fabric, the six everyday potsherds studied are very coarse, with a consistent composition, mainly calcareous and fossiliferous, with abundant inclusions, such as shell fragments (one specimen was probably tempered with shells), microfossils, chert, calcareous pellets, calcareous sandstone, fine volcanic inclusions, iron oxides, and rare muscovite mica. The clays used to make the everyday ware seem to come from similar geological settings, rich in calcareous fragments, quartz sand, shell fragments, and microfossils (except Fabric 3, which is not fossiliferous). The latter are Foraminifera and probably belong to the gastropods and nummulites. Shells seem to be naturally present in the raw material exploited for the pottery manufacture, but in sample CPT5 (Group 2, Figs 10A5.4 and 10A5.5) these fragments are particularly abundant and they might have been deliberately added to reduce the plasticity of the clay. In a few cases, the fabrics show some elongated voids typical of plant matter, which was probably naturally present in the clay and burnt out during the firing.

The technology of the coarse ware at this settlement is similar to that employed for the contemporary everyday pots made at the other Impressed ware settlements of the Adriatic coastlines (Spataro 2002: Chapter 6). The pottery was made of local clays which were not thoroughly processed, as shown by the presence of clay pellets and incomplete removal of plant matter. In most cases, the clay was not tempered, although crushed shells were probably added to one fabric. The ceramics were fired at temperatures that did not exceed 700°C, as testified by the intact microstructure of the shell fragments and the lack of vitrification of the paste (Spataro 2017). The low firing temperature likely required the use of bonfires.

In contrast, the *figulina* ware was made following a more sophisticated and skilled *chaîne opératoire*. The clay was well-processed and levigated in order to remove all coarse inclusions and obtain a very fine raw material. This fine clay was not tempered, and it was fired at temperatures above 850°C.

A marl collected for micromorphological analysis (sample F3, see Appendix 10.1) from the ditch of the ditched village shows strong similarities with some of the pots analysed. In particular, the coarse marl has fossiliferous limestone, chert and fine silt, which is very similar to the fabric of sample CPT2 (Group 5).

SEM–EDS ANALYSIS

All the samples analysed in thin section were also studied by SEM–EDS. The machine used is a Philips XL30 Environmental Scanning Electron Microscope (ESEM) with Energy Dispersive Spectrometry (EDS) processed using Oxford Instruments INCA analyser. Ten elements (Na, Mg, Al, Si, P, K, Ca, Ti, Mn, Fe) were quantified and the results were converted into percentages. These percentages are normalised to add up to 100% (oxygen by stoichiometry), and semi-quantitative, because of the porosity of the ceramics (for more detail about the methods used, see Spataro 2002: Chapter 2; 2011).

Sample	Na_2O	M_gO	Al_2O_3	SiO_2	P_2O_5	K_2O	CaO	TiO_2	MnO	Fe_2O_2
CPT1 (*figulina*)	1.2	2.2	13.8	57.4	0.5	2.6	15.7	0.8	0.1	5.7
CPT2	1.6	1.5	15.0	57.1	1.6	3.3	13.6	1.0	0.1	5.6
CPT3	0.7	1.4	11.5	51.8	0.6	1.8	26.1	0.7	0.4	5.0
CPT4	1.2	1.3	11.6	63.1	0.2	2.9	15.3	0.5	0.2	3.7
CPT5	1.7	1.2	12.8	55.7	0.2	2.1	21.5	0.6	0.1	4.1
CPT6	1.1	1.2	12.3	62.4	0.6	3.2	13.8	0.6	0.2	4.6
CPT7	1.3	1.6	12.8	56.7	0.4	2.5	19.3	0.6	0.1	4.8

Table 10A5.2 SEM–EDS analyses of the Cava Petrilli potsherds: each value is the average of five bulk analyses (86x each, covering an area of c.1.5 x 1.0mm)

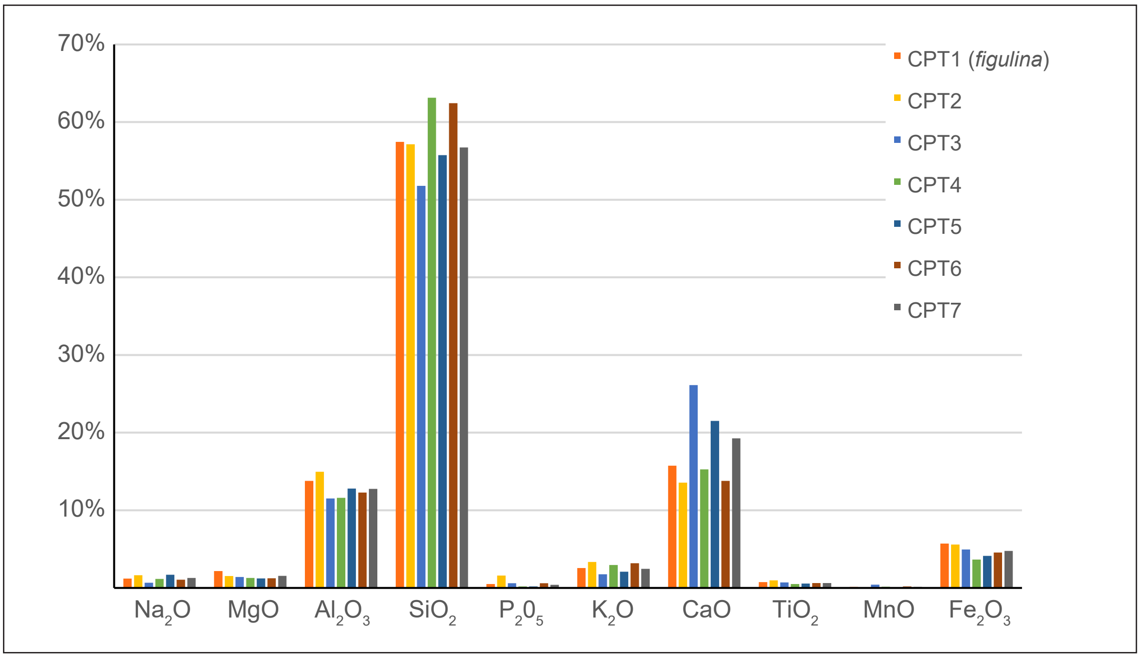

Fig. 10A5.8 Cava Petrilli: histogram showing the SEM–EDX averaged results from the everyday potsherds (CPT2–7) and the *figulina* ware (CPT1)

Five bulk analyses were carried out on each sample, each covering an area of about 1.5 x 1.0mm. The results show some variation in the composition of the coarse pottery, whereas the *figulina* paste is more homogeneous. The average of the five analyses from each sample is regarded as being representative of the composition of that sherd (Table 10A5.2, Fig. 10A5.8). Table 10A5.2 shows that all samples are rich in silica, alumina, calcium and iron oxides, and have relatively low magnesia, soda, and titanium dioxide contents. The *figulina* ware is not chemically different to the rest of the assemblage studied, except for the magnesia content, which is slightly higher than in the other potsherds. To reinforce this hypothesis, there are the microfossils which seem to be of the same type of those found in the coarse ware.

CORRELATIONS WITH THE CONTEMPORANEOUS CERAMIC ASSEMBLAGES FROM THE APULIAN SITE OF SCAMUSO

In order to understand the pottery from Cava Petrilli in a wider scale, we can compare it to the pottery from a contemporaneous site in the same region, Scamuso. Scamuso is one of the earliest Impressed ware sites of the Italian peninsula, located on a small calcarenitic promontory projecting towards the sea, some 3km east of Torre a Mare, 18km southeast of Bari, in Apulia (Spataro 2002: 163; see also Biancofiore 1957; Coppola 1986), about 150km southeast of Cava Petrilli.

Previous analyses (Spataro 2002: 163–75) on 21 sherds of everyday ceramics from Scamuso show that the potsherds can be grouped into four fabrics: a) a slightly calcareous and fossiliferous paste with abundant poorly-sorted quartz and calcareous fragments, some flint, feldspar, green pyroxene, and a lava grain in one sample; b) an iron-rich paste with abundant poorly-sorted quartz and polycrystalline limestone (some of which is fossiliferous), occasional flint and calcareous sandstone fragments; c) an iron-rich paste with abundant polycrystalline limestone and no added inclusions; and d) a calcareous paste with abundant polycrystalline limestone, occasional feldspar, flint and pyroxene (Spataro 2002: 166).

On the basis of the thin sections, SEM–EDS and X-ray diffraction (XRD) analyses of the potsherds and a soil sample collected from the site, and the geology of the area, it was possible to suggest that the Impressed ware pottery was produced locally (Spataro 2002: 175). Most pots were made using calcareous, fossiliferous and kaolinitic clays, most probably tempered with a volcanic sand from the La Lama river, which flows 2km from the site (fabrics a and b, see above), and in rare cases with organic matter (Spataro 2002: 175).

The ceramics from Scamuso, in contrast to those from Cava Petrilli, do not show any shell fragments, but they contain igneous inclusions, fresh feldspar, abundant calcareous fragments (occasionally fossiliferous), chert, calcareous sandstone fragments, abundant quartz sand, and in a few cases elongated voids left by the burning of organic matter. At both sites the firing temperature of Impressed ware was low, never exceeding 750ºC, as testified by the presence of calcareous fragments, shells and bi-refringent (non-vitrified) pastes. This assumption suggests that kilns were not required for the firing of the vessels, which were most probably fired in bonfires.

Like the Cava Petrilli sherds, the Impressed ware pottery analysed from Scamuso (Spataro 2002: 171, 240) is rich in calcium oxide, with variable but relatively high potash and silica, but the ceramics from Scamuso have higher alumina and iron content (Table 10A5.3). Principal component analysis (PCA) was used to interpret the SEM–EDS results and to help in the identification of chemical groups based on the concentration of the oxides. Fig.10A5.9 shows the scatter plot of the results from *figulina* ware and the everyday potsherds analysed from Cava Petrilli and the Scamuso everyday pottery. Six samples of everyday ware were omitted from the PCA (samples SCA6, 8, 9, 15, 18 and 19) because they are statistical outliers. The scatter-plot shows a clear chemical separation between the samples from the two sites, suggesting that the raw materials exploited for their production were collected in different areas.

Sample	Na_2O	MgO	Ai_2O_3	SiO_2	P_2O_5	K_2O	CaO	TiO_2	MnO	Fe_2O_3
SCA1	0.7	1.2	18.0	63.2	0.4	5.0	3.5	0.7	0.1	6.6
SCA2	0.9	1.2	15.2	59.4	0.3	3.0	11.5	0.7	0.0	6.3
SCA3	0.6	1.2	13.6	60.6	0.4	2.8	13.9	0.6	0.0	5.3
SCA4	0.0	0.9	17.0	62.0	0.9	2.8	8.2	0.8	0.2	6.3
SCA5	0.8	1.2	19.0	58.8	0.8	3.5	6.3	0.7	0.1	8.1
SCA6	1.2	1.5	18.2	62.4	0.4	5.2	2.4	0.7	0.9	6.7
SCA7	0.4	1.2	15.2	56.0	0.5	3.0	15.6	0.8	0.2	6.5
SCA8	1.1	0.9	23.9	50.2	0.8	1.4	8.6	1.4	0.1	10.8
SCA9	1.2	1.4	21.8	41.8	0.8	1.1	19.7	2.6	0.1	8.9
SCA10	0.1	1.6	14.8	58.8	0.4	2.7	13.1	0.7	0.0	6.9
SCA11	0.7	1.0	15.2	64.8	0.5	3.1	7.0	0.6	0.0	6.4
SCA12	2.4	1.7	19.2	60.2	0.5	3.2	3.9	0.8	0.3	7.0
SCA13	0.7	1.0	15.8	64.4	1.0	3.8	5.5	0.6	0.2	6.4
SCA14	0.6	1.6	18.2	56.6	0.5	2.9	9.7	0.7	0.1	8.6
SCA15	0.5	1.4	7.6	22.6	0.7	1.6	61.9	0.4	0.0	2.3
SCA16	0.0	0.9	19.8	63.2	0.4	2.8	3.8	0.9	0.1	7.7
SCA17	0.8	1.4	19.2	56.8	0.5	4.8	8.3	1.0	0.0	6.8
SCA18	0.0	0.9	19.2	45.4	1.1	1.0	16.2	3.1	0.0	12.6
SCA19	3.7	3.2	15.4	44.6	1.0	2.8	22.2	0.7	0.2	5.5
SCA20	0.5	1.2	18.0	63.8	0.6	4.0	3.3	0.8	0.2	6.9
SCA22	1.1	2.8	13.7	53.1	0.2	2.3	20.2	0.8	0.1	5.7
SCA23	0.9	1.8	13.5	54.6	2.5	2.3	17.4	0.9	0.1	6.0
SCA24	0.8	1.6	12.4	55.5	0.2	2.5	21.0	0.7	0.1	5.2
SCA25	0.8	2.0	15.7	55.6	0.3	2.6	15.9	0.8	0.0	6.3

Table 10A5.3 SEM–EDX results (each result is the average of five bulk analyses) from the Impressed Ware and *figulina* potsherds analysed from the Scamuso site in Apulia (after Spataro 2002: 240; see Spataro 2009 for SCA22–25, *figulina* ware)

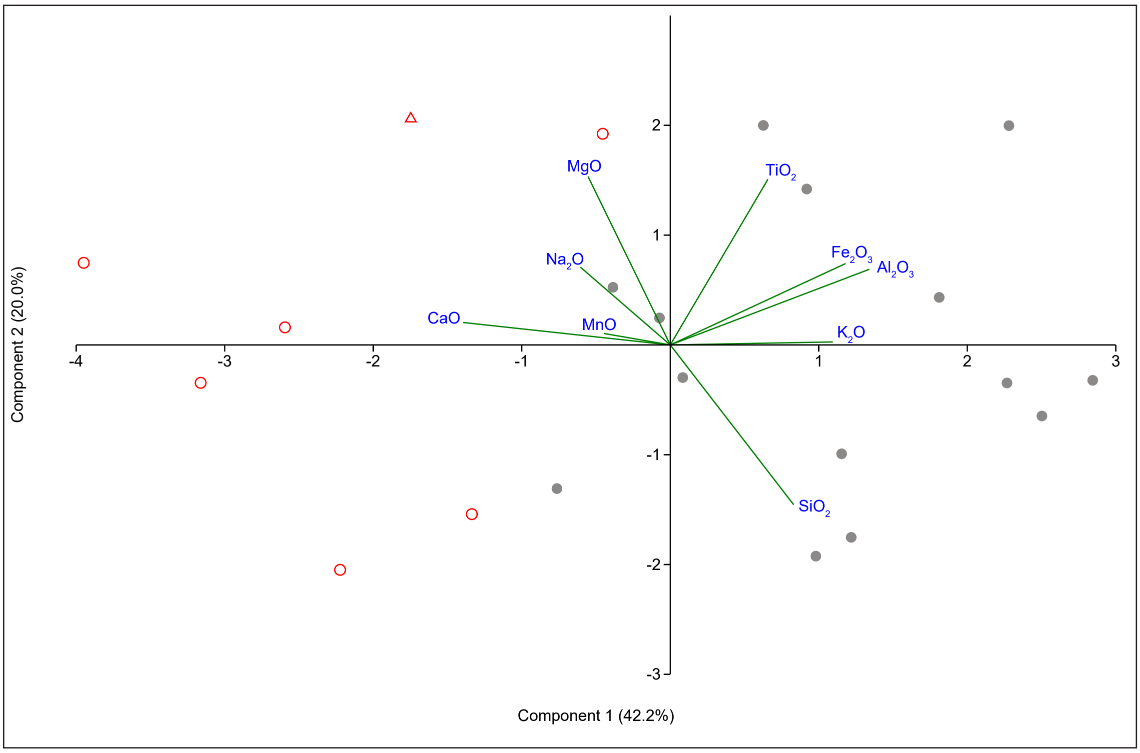

Fig. 10A5.9 Principal Components Analysis of SEM–EDS results of the *figulina* and everyday ware from Cava Petrilli (red) and everyday ware only from Scamuso (grey); each symbol represents the average of five bulk analyses. PCA of the correlation matrix was undertaken using PAST 4.02 (Hammer *et al*. 2001)

FIGULINA WARE IN CONTEXT

The *figulina* ware from Cava Petrilli was made using a technique typical of the production of this type of pottery in the rest of Italy, and in particular in the Apulian region, starting from the middle of the sixth millennium BC (Spataro 2002: 179–91). *Figulina* ware seems to be the first specialised pottery in the Neolithic: its production is based on the exploitation of specific clay sources (mainly calcareous and fossiliferous); the clay is levigated (it is always very fine, with occasional inclusions, and the few inclusions are generally very fine in size, e.g. <0.03mm); and it is fired at high temperatures (more than 850 ºC, as testified by the vitrified fabrics) in an oxidising atmosphere. The temperature and atmosphere control implies the use of kilns. On these criteria, it is consistent to suggest that specialised artisans produced *figulina* ware (Spataro 2009; 2017: 68).

The fine fabric of the *figulina* from Cava Petrilli shows strong similarities to the pastes of other *figulina* pottery studied from southern Italy. Scientific analyses, minero-petrographic and SEM–EDS studies, indicate that a similar paste, fossiliferous, calcareous and well-fired, with well-sorted quartz, fine muscovite mica, occasional pyroxene and feldspar, was used for the production of Apulian *figulina* ware found at the sites of Scamuso (the 'Serra d'Alto' phase, c. first half of the fifth millennium BC: Spataro 2017: 68), Gravina di Puglia, Grotta delle Mura, and Caverna Elia (Spataro 2002; 2009; 2017).

Sample	Na_2O	MgO	Ai_2O_3	SiO_2	P_2O_5	K_2O	CaO	TiO_2	MnO	FeO
CEL1	0.6	3.7	16.4	52.5	1.4	2.4	15.3	0.8	0.1	6.9
CEL2	0.8	3.0	13.3	55.8	2.5	2.6	15.6	0.7	0.1	5.7
CPT1	1.2	2.2	13.8	57.4	0.5	2.6	15.7	0.8	0.1	5.7
SCA22	1.1	2.8	13.7	53.1	0.2	2.3	20.2	0.8	0.1	5.7
SCA23	0.9	1.8	13.5	54.6	2.5	2.3	17.4	0.9	0.1	6.0
SCA24	0.8	1.6	12.4	55.5	0.2	2.5	21.0	0.7	0.1	5.2
SCA25	0.8	2.0	15.7	55.6	0.3	2.6	15.9	0.8	0.0	6.3

Table 10A5.4 SEM–EDS composition of the *figulina* ware potsherds analysed from Caverna Elia (CEL), Cava Petrilli (CPT) and Scamuso (SCA): each value is the average of five bulk analyses at 86x (c.1.2 x 1.0mm)

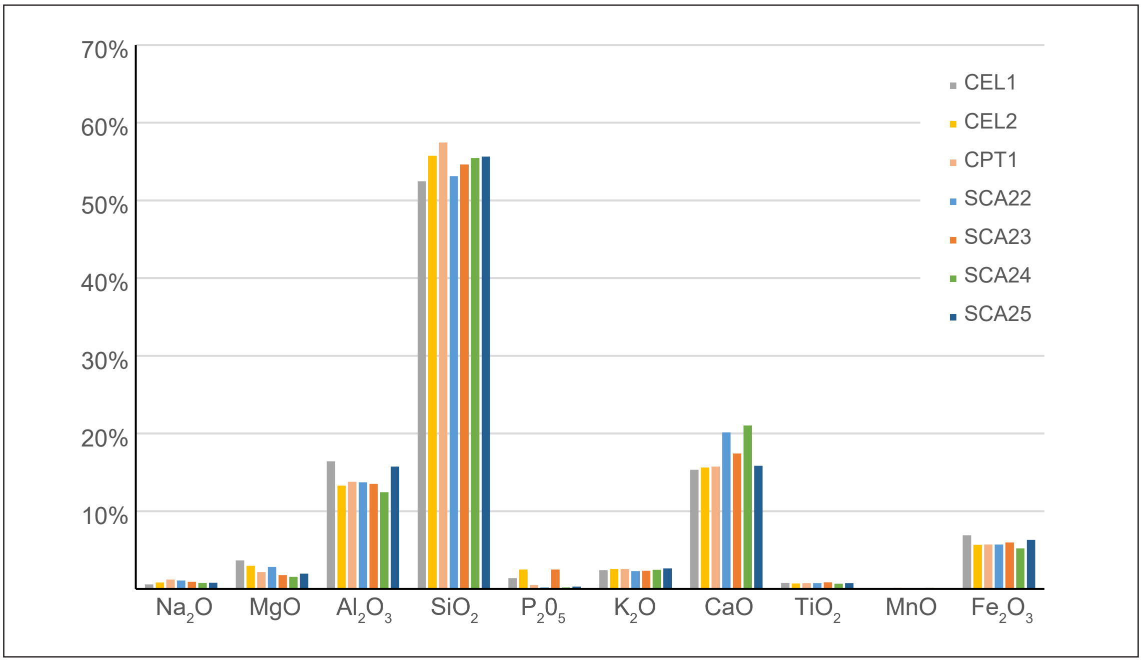

Fig. 10A5.10 Histogram of SEM/EDS results (expressed as percentages) from *figulina* ware samples from Caverna Elia (CEL), Cava Petrilli (CPT)and Scamuso (SCA); each bar is the average of five bulk analyses

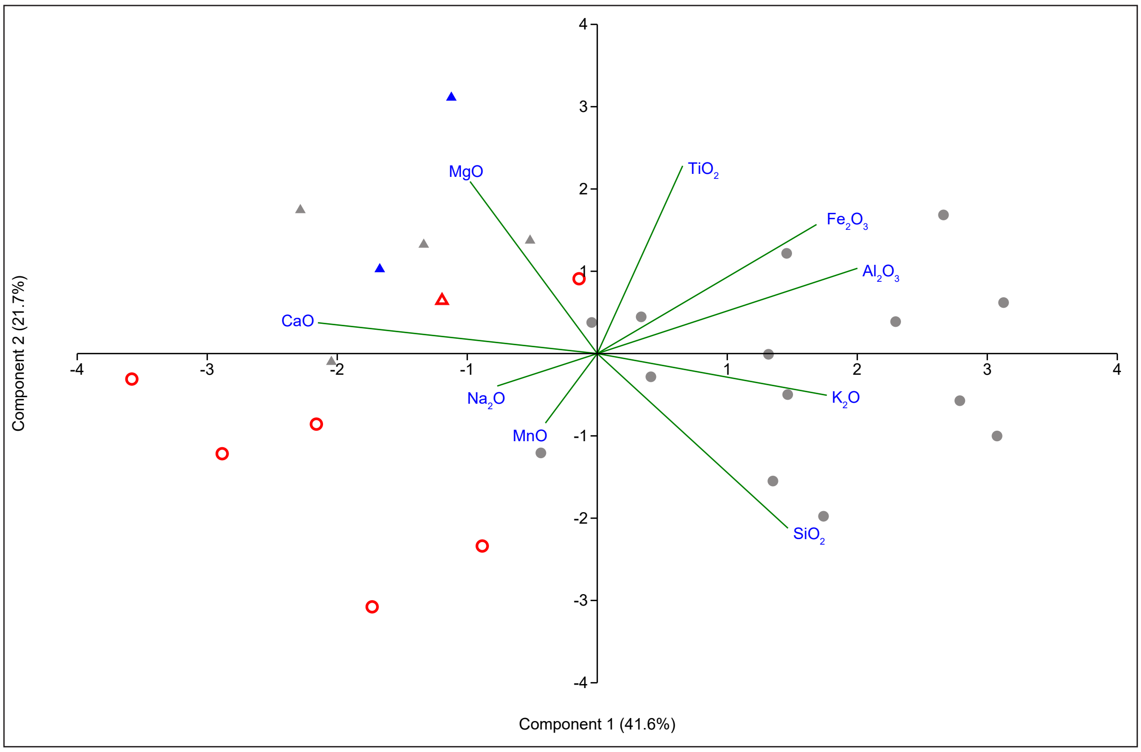

Fig. 10A5.11 Principal Components Analysis of SEM–EDS results of the *figulina* and everyday ware from Scamuso (grey), Cava Petrilli (red) and Caverna Elia (blue); each symbol represents the average of five bulk analyses; triangles: *figulina* sherds; dots/circles: everyday pottery. PCA of the correlation matrix was undertaken using PAST 4.02 (Hammer *et al*. 2001)

In particular, the *figulina* ware from Gravina di Puglia and Grotta delle Mura contain the same species of microfossils, suggesting a regional provenance for both productions (Spataro 2002: 186). In thin section, sample CPT1 (Figs 10A5.2 and 10A5.3) is very similar to sample CEL2 from Caverna Elia. They are micaceous and calcareous, with the same type of microfossils and with very similar size and sort of inclusions. A *figulina* sample from Scamuso (SCA23) is similar to the *figulina* from Cava Petrilli, showing the same type and distribution of inclusions. Some other *figulina* sherds analysed from Scamuso (e.g. SCA22) are coarser and more calcareous (see Spataro 2009).

Strong similarities can also be noticed in the chemical composition of the *figulina* ware from the Apulian sites (Table 10A5.4, Fig. 10A5.10). The sherds show high percentages of potash, magnesia, iron and calcium oxides. Variations in calcium oxide may be due to the differences in presence of polycrystalline limestone fragments in the pastes.[1] Fig. 10A5.11 is a scatter-plot of PCA output from the everyday and *figulina* pottery analysed from Scamuso and Cava Petrilli and the *figulina* ware from Caverna Elia. The chemical composition of the *figulina* ware from all three sites is unlike that of coarse ware from Scamuso (although it must be remembered that six outliers have been removed from the figure, see above), but is more similar to that of the coarse ware sample CPT2, which petrographically has clear affinities with the local marl at Cava Petrilli. The magnesia content of all the *figulina* sherds is relatively high. The other components PC3, 4 and 5 did not any reveal any additional pattern.

Other similarities can be identified with the *figulina* ware of the 5th millennium BC from the following sites of the Murge plateau: Grotta Scanzano, Grotta della Tartaruga di Lama Giotta and Canne-Setteponti (Muntoni *et al*. 2006). The sherds were analysed by petrography, X-Ray fluorescence (XRF) and Powder X-Ray Diffraction (PXRD). Results show that the fine ware shows quartz, feldspar, muscovite and foraminifera; the chemical analyses show abundance of calcium oxide, alumina and silica. The authors suggest that the raw materials employed to produce the fine ware might come from the Plio-Pleistocene marl clays of northern and central Apulia (Muntoni *et al.* 2006: 96–7).

DISCUSSION AND CONCLUSION

The results of this study show that the chemical composition of the *figulina* ware from Cava Petrilli is similar to that of the coarse ware from the same site (Table 10A5.2). The fabric of the soil collected from the ditch in which the *figulina* and the everyday pottery were found is mineralogically similar to those of the coarse ceramics analysed. There is therefore no reason to suspect that these pots were not made locally.

The clay outcrop chosen by the potters for the *figulina* pottery found at Cava Petrilli resembles the Plio-Pleistocenic clay-marls that Muntoni *et al.* (2006: fig. 1) suggest for the *figulina* ware of the Murge plateau. The *figulina* ware from Cava Petrilli, although similar to the other *figulina* samples studied from the Apulian region (calcareous, fossiliferous and ferruginous, see Spataro 2009: 70), also shows chemical similarities to the coarse ware specimens found at the site itself. Furthermore, the same types of microfossils are present in clays used for both types of pottery production. However, the clay preparation for the *figulina* ware was based on a specific process, called levigation, in which coarse particles were removed by mixing the clay with water so that larger particles could settle out while fine particles remained in suspension, (Cuomo di Caprio 1985: 60–1), which was not used to produce the impressed and burnished ware. As well as the clay levigation, the controlled firing atmosphere and the high temperatures used to produce *figulina* pottery suggest that it could have been made by an elite of specialist potters, who were more skilled and invested more in this product than the potters who made everyday ceramics (Spataro 2017: 76). As no intermediate product has been discovered between *figulina* and utilitarian ceramics, which require simpler technologies, *figulina* is an 'innovative tradition' (Spataro 2017: 75). *Figulina* appears in the archaeological record in this form, and it did not evolve for about 1500 years (Spataro 2017: 75). Unfortunately, the function of *figulina* ware has not been clarified yet. Organic residue analysis of three *figulina* bowls and vessels seems to suggest that it was used to store or process plant material (Debono Spiteri 2012: 214, Chapter 8, fig. 8.9).

Figulina ware has always been described as a possible exchange or prestige item (see Barfield 1981; Cassano 1993; Malone 1985) although the results of the mineralogical and chemical analyses of 59 figulina sherds from the Italian and Croatian coastlines, attributed to the Impressed Ware, Serra d'Alto, Square-Mouthed Pottery Culture, Danilo and Hvar cultures, suggest that it was exchanged at no more than a regional scale (Spataro 2009: 70). A more regional or even local-scale production of *figulina* ware reinforces the idea of strong social interaction between communities, where the exchange of technological skills (e.g. the know-how of different *chaînes opératoires*, e.g. coarse ware and lithic) witnesses continued contacts and exchange of ideas between communities. Given that *figulina* production required specialised skills, and that is is usually rather scarce, it is likely that it was a special product made for a few individuals, and was probably used on special occasions, such as marriages and other ceremonies. The apparently local production of *figulina* pottery found at Cava Petrilli implies that such products were not only made for exchange between communities, but also for local consumption.

ACKNOWLEDGEMENTS

I would like to thank Dr Donato Coppola and Prof. R. Whitehouse for providing the potsherds for analysis and Dr Richard Macphail and John Meadows for their suggestions and comments.

NOTES

1 Variations in phosphorus could be due to post-depositional processes (Freestone *et al.* 1985).

Chapter 10 Appendix 6:

Animal Bones from Cava Petrilli

Animal Bones from Cava Petrilli

Louise Martin

INTRODUCTION

The group of animal bones examined came from two different ditch sections, F1 and F2 both thought to be part of the same village ditch (Table 10.1).

Preliminary identifications

F1 (12)

- Cattle radius, proximal and shaft, right side, medial fragment
- 5 cattle/horse size longbone fragments (some appear to belong to radius above)
- Sheep/Goat (probably sheep) radius, proximal and shaft, left side (small sheep)
- Pig metapodial, distally unfused, therefore young

F2 (4)

- Cattle/Horse size rib fragment x 2
- Cattle/Horse size thoracic vertebra spine
- Cattle/Horse size longbone fragment
- Hare ulna, proximal and shaft, left side, fused
- Hare ulna, proximal and shaft, right side, fused
- Hare radius, proximal and shaft, right side, articulates with ulna above
- Hare mandible and teeth (cheek teeth and incisors), right side
- Dog mandible (posterior part of alveolar region, condyle and hinge), teeth unerupted in crypt, therefore young
- Sheep/Goat sized skull (doesn't match exactly but it's not carnivore, likely to be medium artiodactyl), areas around petrous, temporal, parietal
- Sheep/Goat phalanx 1 (first toe bone), proximal and distal but split medio-laterally

EDITORS' COMMENTS

The small sample of animal bones is consistent with the information available from excavated Tavoliere sites (see, for example, Bökönyi 1977–1982; 1983; Curcio *et al.* 2004; Sorrentino 1983), which indicate a mixed farming economy, with very little contribution

from wild animals (see discussion in Chapter 2). Domesticated horse is not known in Italy before the Bronze Age, so we may assume that the 'cattle/horse' size bones came from cattle. The presence of hare in the sample, albeit probably representing a single animal, suggests a relatively open environment – a conclusion supported by the evidence of the molluscs present (Appendix 10.7).

The deposits from which the samples come belong to the lower part of the ditch sequence, interpreted as resulting from silting and anthropogenic processes, derived from cereal processing and/or the burning of stock stabling waste (Table 10.1). Both deposits have associated radiocarbon dates, falling in the later 6th millennium cal. BC (see Appendix 10.3 for details).

Chapter 10 Appendix 7:

Terrestrial Molluscs from Cava Petrilli

Terrestrial Molluscs from Cava Petrilli

Ken Thomas

The snails examined comprised 43 more or less complete examples, plus some additional fragments; they came from the two sections through the main enclosure ditch (F1 and F2) (Table 10A7.1).

Taxon	Context/ sample no						
	F1, layer 12 /S1	F1, layer 11/S2	F1, layer 13/S3	F2, layer 7/S1	F2, layer 4 /S3a	F2, layer 4/S3b	F2, layer 2/D4
Pomatias elegans **(Müller)**	2	-	11	-	-	-	-
Oxychilus **sp.**	-	-	1	-	-	-	-
Rumina decollata **(Linn.)**	1	-	3	1	-	1	3
Clausiliidae indeterminate	-	-	1	-	-	1	-
Helicidae indeterminate	-	-	-	1	-	-	-
Trichia/Trochulus **sp.**	1	-	-	-	-	-	-
Monacha **sp.**	-	-	1	-	-	-	-
Cernuella **sp. (probable)**	-	11	2	1	-	-	1
Isopod fragments	-	-	-	+	-	-	-

Table 10A7.1 Terrstrial molluscs from the main enclosure ditch at Cava Petrilli. The uncertain identification of the Cernuella fragments is due to their poor preservation

Pomatias elegans and *Rumina decollata* favour uncultivated open ground, among bushes, on soil among limestone outcrops etc. *Oxychilus* sp. varies according to species but generally prefers shaded and moist habitats, often with dead organic matter (leaf litter etc.), such as found in ditches. *Clausiliidae* also vary according to species; they are often found on bare rocks (cliffs, stone walls etc.) and beneath stones, but some species are also found in shaded environments. *Trichia/Trochulus* sp. varies according to species but generally occupy a range of habitats, so their occurrence is not very informative; however they are usually absent from very dry localities (ditches would be highly suitable). *Monacha* sp. is found in a range of

habitats – grassland, waste ground and scrub hedges – but not usually in woodland. *Cernuella* sp. varies according to species, but always occur in dry open areas (not usually ditches, unless they are very dry and not overgrown).

SUMMARY

The assemblages are very small and with low diversity, but are compatible with a damp (but not significantly wet) ditch which was shaded (probably with vegetation growth or accumulated plant litter) that was located in a fully open environment (possibly grassland, open scrub, or disturbed soil conditions). To some extent this is a time-transgressive interpretation, based on an interpretation of the assemblages taken together. The assemblage from F1, layer 13 (S3) is, however, sufficiently diverse for a chronologically more constrained interpretation to be made. The various elements in this particular assemblage are compatible with the broad environmental scenario suggested above.

EDITORS' COMMENTS

F1, layer 13 (S3) belongs to the part of the sequence interpreted as deliberate backfill (Table 10.1), therefore post-dating the deposits interpreted as resulting from silting and anthropogenic processes, derived from cereal processing and/or the burning of stock stabling waste. The earlier deposits have radiocarbon dates in the second half of the 6^{th} millennium cal. BC (see Appendix 10.3). The molluscs therefore indicate that at least by the end of the 6^{th} millennium cal. BC the local environment was fully open and this may have been true of most of the Tavoliere.

Chapter 10 Appendix 8:

Wear and Tear to the Archaeological Landscape

Wear and Tear to the Archaeological Landscape

Mike Seager Thomas

Among the most striking features of the Neolithic sites visited by us during the course of the project was the amount of pottery and other artefactual material visible on the ground. Out of the 174 enclosures visited during the Mass Survey, 16% produced surface finds in quantities rated as abundant on a four-point scale of rare, sparse, common and abundant. No doubt some of these sites are genuinely rich in artefactual material – even among those with exposed features, we have seen considerable variability in artefact density. But there is good evidence from many that much of this material was brought up from below. Pottery, for example, tends to be little abraded and artefactual material of all types often has a calcareous rind that can only have developed underground (Fig. 10A8.1). Fields are also littered with broken *crosta*, which must likewise have come from below.

The obvious mechanism for this is the Italian deep plough. Indeed as early as 1949, John Bradford remarked that the Italian fashion for deep ploughing "has destroyed some of my finest cropmark sites" (Radcliffe 2006: 56), since when it has been perceived by many as a major threat to the archaeology of the Tavoliere (e.g. Brown 1998: 21; Jones 1987: viii; Riley 1992: 292).

Deep ploughing, however, is only one of many inadequately controlled threats to the archaeology of the Plain. As landscape archaeologist Giuliano Volpe writes: "The use in farming of ever more powerful equipment has now been joined by uncontrolled building activity, the construction of roads and gas pipelines, the digging of drainage ditches and canals and (in the last few years) the construction of wind farms – all without adequate archaeological evaluation. Bit by bit these interventions are sweeping away the information about the past which lies buried in the landscape" (Volpe 2006: 33). Not that we can expect ever to explore the huge underground landscape of the Tavoliere *in toto*, or in anyway wish to trade the future of the region for its past, but we should take advantage of the opportunity these interventions create and more fully study the archaeology revealed in them.

PHYSICAL THREATS

Deep ploughing

Deep ploughing benefits Tavoliere agriculture by breaking up its heavy soils and shattering the surface of the *crosta*, thus accelerating its pedogenisis, and its use is not likely to be much affected by the arguments of modern agriculturalists from outside the region who

Figure 10A8.1 Heavily calcreted and freshly broken sherds from site J200

believe it to be uneconomical and bad both for the soil ploughed and the wider environment. Nor is it likely to be stopped by the pleas of the archaeological community. The three feet (approximately 1 metre) referred to by Bradford in the letter quoted above, however, is probably close to the maximum depth to which actual deep ploughing reaches on the Tavoliere. (At La Panetteria the plough soil was 0.5 metres deep (Trump 1987: fig. 73) and at Passo di Corvo it was 0.4 (Tiné 1983: 37)). Of course modern agriculture has damaged the archaeological landscape of the region, not least that of the medieval and WW2 periods, which have been significantly abraded since then, but its impact is unlikely to be as serious as most commentators believe. The deep ploughing argument, moreover, displays a complete misunderstanding of what can and what cannot be recovered archaeologically. In immature – that is to say shallowly developed – soils, deep ploughing could result in a unique loss of superficial features. But most of these will have been ploughed away years, probably millennia ago, while recent damage is unlikely to reach deeper than soil development in its more mature soils, which itself renders most earthen features invisible.

Building and transport

A much greater threat is posed to the archaeology of the Plain by new building and the transport network supporting this. Masseria Pantano (site J175) has been partially engulfed by the spread of the suburbs to the south of the Foggia, and Santa Cecilia (sites J48 and J49), southwest of the town, significantly built upon. An enclosure on the outskirts of Trinitapoli (site A195) has been partially built on, and Favecotte (site A163), north of Cerignola, more or less destroyed by a business park there. Meanwhile, keeping pace with this, the A14 autostrada has partially obliterated Masseria Cupola (site J233), southeast of San Severo, missed several other Neolithic enclosures by a hair's breadth, and cut a swathe through Iron Age Arpi. The SS 655 south of Foggia has overlain Masserie Biasotta (site J65) and Fongo (site J180) (Volpe *et al.* 2003: fig. 6.2) and cut through Masseria Bongo (site J71) (Fig. 10A8.2); and between Foggia and Manfredonia, the SS 89, which overlies site J204, grown from a single lane road in to a massive two lane highway. There is also an improved railway line between Foggia and Lucera, which has resulted in a new cutting through Masseria

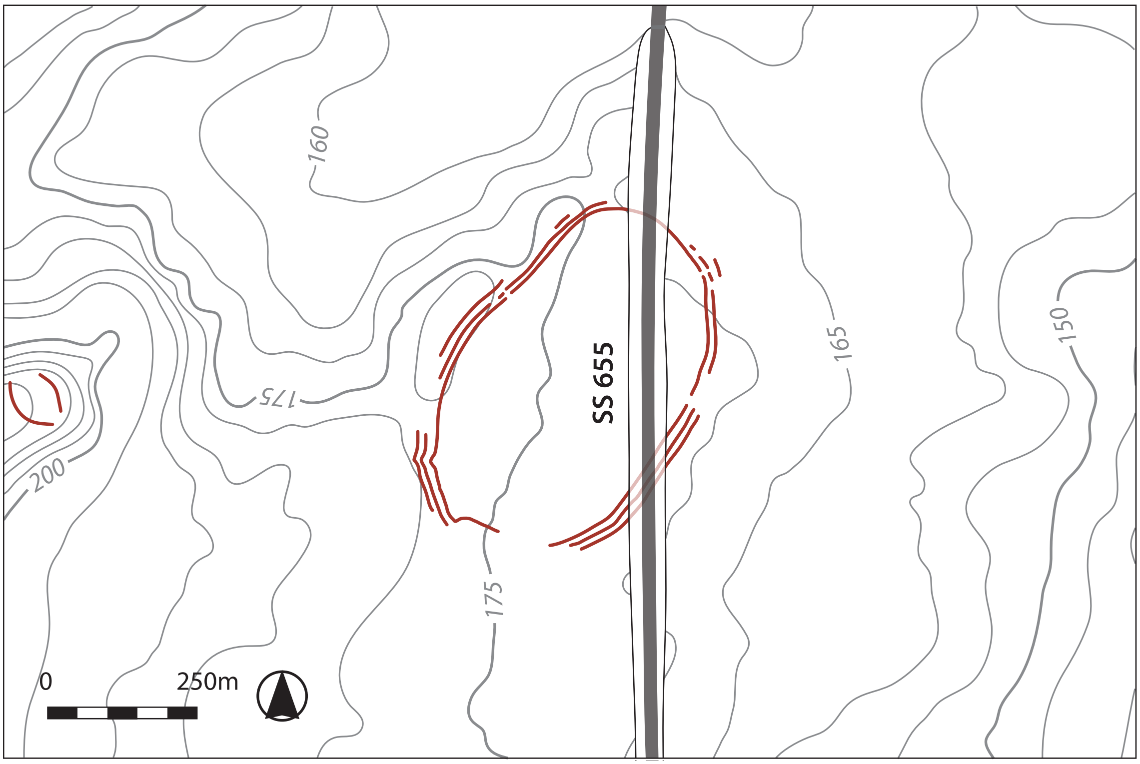

Figure 10A8.2 Road cutting for the SS695 through Masseria Bong (J71). Bongo has also been cut by a major pipe trench

Fragella (site J39), already massively overlain by an interchange on the SS 17 between the two towns.

Water works

There are two major reservoirs on the Plain, one in the Celone Valley, and one in the Capacciotti Valley, southwest of Cerignola. Both are surrounded by Neolithic enclosures, but in neither case does the water reach these, though they have inundated archaeology of other periods (Volpe *et. al.* 2003: fig. 1). During our surveys we encountered damage caused by the digging of a drainage ditch (at Stazione di Amendola – site J185), the construction of a farm reservoir (Masseria Ponte Rotto – site A79) and the digging of a pipe trench – for irrigation water (at Iron Age Arpi) (Fig. 10A8.3), while a very wide trench tangential to the SS 665 at Masseria Bongo interred a very large steel water or gas pipe.

Wind farms

Apulia leads Italy in wind energy production and the growth in this industry on the Tavoliere is self-evident to everybody who works there, with the numbers and geographical distribution of wind turbines increasing year by year. (Installations nearly doubled between 2008 and 2009 – OECD 2012: 194). The threat in the field is three-fold. Firstly wind turbines require large foundations. Typically these comprise a reinforced concrete slab, buried underground, ranging from about 9–18m across and 2–9m deep, depending on turbine size, which on the Tavoliere is usually big. With the deployment of bigger and bigger turbines this impact is likely to increase. Secondly building wind farms necessitates new access roads and hardstandings capable of taking the crane used to erect the turbines, concrete mixer lorries (as many as 50 per turbine: Renewable Energy Systems nd., 8), and other construction and maintenance traffic. Finally, the electricity generated has to be removed from the site and this requires underground cables, laid below the level to which ploughing reaches, from the turbines to a switchgear house and then off-site. To date tubines have been raised within the

Neolithic sites of Masseria Mansueto (site A31) and Monte San Vincenzo (site A33) (Fig. 10A8.4) and close to Masseria La Quercia (site J72), Ripa Tetta (site A35) and I Pavoni (site A154) (Fig. 10A8.5) but things are moving quickly and it is likely that their impact on the region's archaeology will continue to grow.

Fig. 10A8.3 Pipe trench through Iron Age Arpi, dug and filled over a weekend. The trench cut through at least 18 archaelogical features

Fig. 10A8.4 Wind turbine erected within the Neolithic site of Monte San Vincenzo (A33) *Photograph: Google Earth*

Quarrying

In all we identified four enclosures that had been quarried, in every case for gravel – Cava Petrilli (site J4), Canale Gavitella (site J96), Masseria del Capitano II (A130) and I Pavoni (site A154). At Cava Petrilli, of the enclosure visible in the aerial photo, only a small section of the enclosure ditch survived, along with a few features outside of it (Figs 10.1 and 10.5–10.12). A pause in quarrying allowed us to record these, but by the end of the project quarrying had recommenced and most of what we had recorded was destroyed. Here Neolithic pottery and other material spilled from the exposed sections through the enclosure ditch and littered the surface of the quarry. Canale Gavitella was being actively quarried when we first visited but went out of use soon afterwards. About a quarter of the visible enclosure has been destroyed (Figs 10.14–10.21). Quarrying at Masseria del Capitano II dates to World War II, when it appears to have been quarried for hard core for the construction of nearby Stornara airfield (the 1945 aerial photo of the site shows fresh

activity at the quarry and a well-used track between the two) (Seager Thomas 2020: 69). The quarry face, which seems unchanged from that time, clips the main enclosure (Volume 2, chapter 4). Finally, at I Pavoni, which has also now gone out of use, quarrying punched a hole through the outer enclosure (Fig. 10A8.5) several tens of metres into the site, where sections through two deep interior ditches are clearly visible (Volume 2, chapter 4). Here, as at Cava Petrilli, the quarried ground was rich in Neolithic material.

The impact of these threats on sites is very much contingent on their wider landscape context, which may enhance it, diminish it or remove it altogether, and this in turn is conditioned by the varying landscape interests of people in the past. Individual threats range from quite small interventions to the total destruction of sites. Luckily for us the threats with the greatest potential impact – major reservoirs and road schemes – are the least likely to impinge on the visible Neolithic archaeology of the Plain, owing to their preference for low lying locations little favoured by Neolithic ditch diggers, though they affect archaeology of other periods. Luckily, too, wind farms, which do target the kind of locations favoured during the Neolithic for ditched enclosures and may involve digging right through them, have a small and widely spaced impact (perhaps 25x25 metres for the for the foundation of a turbine *plus* services – e.g. Edgeworth 2008: 30). These are real but for the Neolithic archaeology of the Plain relatively low level threats. On the other hand building and deep ploughing can occur anywhere, while gravel quarrying, because fossil river terraces comprising these were favoured during the Neolithic for ditched enclosures, poses an enhanced threat.

PHENOMENOLOGICAL INTERFERENCE

In conception, the Tavoliere-Gargano Prehistory Project was a phenomenological survey. Our primary interest was not the surviving archaeology of the Plain, but its sensory landscapes: the sights, sounds and smells associated with it, which, by visiting and probing a range of different sites, we hoped to reconstruct and contextualise. These sorts of data are no less threatened by ongoing development on the Plain than the buried landscape. The assessment of local and regional visibility is made difficult by buildings, road embankments and solar farms, by heat-haze rising off stubble, by southern Italian smog, and – in level areas of the Plain – tall growing crops such as vines and olives; that of audibility, by the pervasive noise of road traffic; and that of smell, by the stink of huge ziggurat-like constructions of rotting straw, and of diesel fuel and fish fertilizer, rising from the plough soil. More generally, the Plain's *Spirit of Place* is compromised. Surveyors cannot easily project themselves into the Neolithic past with a wind turbine swishing overhead and a tractor crawling across the horizon. The contemporary reality of these things is just is too potent. The result is an incomplete or tainted record, which, like that that we have of the the Plain's hard archaeology, is left to the archaeologist to fill out.

FORTUITOUS INTERVENTIONS?

At the time of writing, we know of standing sections through 11 Neolithic enclosures on the Plain (at sites J4, J8, J39, J96, J71, J185, J195, A130, A154, A163 and A195) and nearly 30 exposed feature sections, and it is certain that the cleaning of spoil and vegetation from these sites would reveal more. Obviously development poses a significant threat to its archaeology. Not only is development random destruction, however, it is also random sampling, the usefulness of which is demonstrated by our work on exposed sections at Cava Petrilli (site J4) and Canale Gavitella (site J96) (this chapter), and – in a different way – by the aerial photo sites 'groundtruthed' by features visible in exposed sections and/or Neolithic material brought to the surface by ploughing (see Volume 2). This brings us

to the final two threats to the archaeology of the Plain: the lack of interest of the State's curatorial authorities and the self-interest of the academic establishment.

The most obvious benefit of development to the archaeologist is its exposure of a range of types and sizes of archaeological feature in a range of environments that would not otherwise be available. The sections referred to above, for example, are spread widely across the Plain and cover a range of different topographic and geological contexts, and if compared could be expected to yield more data than any section in isolation. Development activity also operates on scales that archaeology by itself cannot hope to match.

Fig. 10A8.5. Quarrying and a wind turbine at the newly discovered site of I Pavoni (A154). The grey patch in the section at the centrre of the picture is one of two Neolithic ditches enclosing the site

We know what the threats are, we know where they are likely to occur, and we know their possible benefits to us as archaeologists. Why therefore do Neolithic (and other) sites on the Plain continue to be destroyed without proper evaluation and why do so many exposed features of this date remain unrecorded in the landscape? The obvious answer is the lack of interest of the state and its curatorial authorities in the underground landscape. Up to a point, however, the fault also lies at archaeology's own door. Though visible on photos in the Bradford Archive several of the aforementioned sites remained unrecognized until recently, and others inadequately plotted, and it would have been difficult for anybody to anticipate where a Neolithic enclosure might or might not be. As far as possible, we have tried to correct this problem. But nor are archaeologists disinterested recorders, and though at times of need they do sometimes step in – as we did at Cava Petrilli – there is a tendency amongst us to perceive rescue archaeology as the responsibility of the developer and curatorial authorities and focus instead on personally interesting topics. If we are fully to understand the Neolithic of the Plain before it is swept away, it will require more of us than this.

Bibliography

Acquafredda, P, & Muntoni, I.M. 2004. Provenienza delle ossidiane mediante analisi chimiche non distruttive. In Cassano, S. & Manfredini, A. (eds), *Masseria Candelaro. Vita quotidiana e mondo ideologico in una comunità neolitica del Tavoliere*: 358–64. Claudio Grenze Editore, Foggia

Acquafredda, P, Laviano, R. & Muntoni, I.M. 2004. Caratterizzazione archeometrica dei mnaufatti in pietra: litotipi utilizzati e loro aree di provenienza. In Cassano, S. & Manfredini, A. (eds), *Masseria Candelaro. Vita quotidiana e mondo ideologico in una comunità neolitica del Tavoliere*: 371–6. Claudio Grenze Editore, Foggia

Acquafredda, P., Muntoni, I. M. & Pallara, M. 2017. La provenienza dell'ossidiana nel Neolitico della Puglia. In Radina, F. (ed.), *47 Riunione Scientifica Preistoria e Protostoria della Puglia*: 809–14. Istituto Italiano di Preistoria e Protostoria, Florence

Alessio, M., Bella, F., Cortesi, C. & Turi B, 1969. University of Rome Carbon-14 dates VII. *Radiocarbon*, 11: 482–98

Alessio, M., Bella, F., Improta, S., Belluomini, G. Calderoni, G., Crtesi, C. & Turi B, 1976. University of Rome Carbon-14 dates XIV. *Radiocarbon*, 18: 321–49

Ambers, J. Matthews, K. & Bowman, S. 1989. British Museum natural radiocarbon meeasurements XXI. *Radiocarbon*, 31: 15–32

Andrews, J., Barrett, J. & Lewis, J.S.C. 2000. Interpretation not rrecord: the practice of archaeology. *Antiquity,* 74, 525–30

Angelucci, A. 1872. *Ricerche preistoriche e storiche nella Capitanata*. Candeletti, Turin

Appadurai, A. 1996. *Modernity at Large: Cultural Dimensions of Globalization.* University of Minnesota Press, Minneapolis

Arias-Radi, G., Bigazzi, G. & Bonadonna, F. 1972. Le tracce di fissione. Un metodo per lo studio delle vie di commercio dell'ossidiana. *Origini*, 6: 155–69

Árnason, A., Ellison, N. Vergunst, J. L., & Whitehouse, A. (eds) 2012. *Landscapes Beyond Land: Routes, Aesthetics, Narratives*. Berghahn Books , New York & Oxford

Barca, D., De Francesca, A.M. & Crisci, G.M. 2007. Application of Laser Ablation ICP-MS for characterization of obsidian fragments from peri-Tyrrhenian area. *Journal of Cultural Heritage,* 8: 141–50

Barfield, L. H. 1981. Patterns of north Italian trade 5000-2000 b.c. In Barker, G. & Hodges, R. (eds), *Archaeology and Italian Society. Prehistoric, Roman and Medieval Studies*: 27–51. British Archaeological Reports International Series 102. Oxford

Barrett, J. 1994. *Fragments from Antiquity. An Archaeology of Social Life in Britain 2900–1200 BC.* Blackwell, Oxford, UK and Cambridge, MA

Barth, F. 1987. Cosmologies in the Making: a generative approach to cultural variation in inner New Guinea. Cambridge University Press, Cambridge

Bartosiwicz, L. 2003. 'There's something rotten in the state...': bad smells in Antiquity. *European Journal of Archaeology,* 6: 175–95

Beare, J.I. 1934 (trans). *De Sensu et Sensibilibus*. eBooks@Adelaide 2004 (http://etext.library.adelaide.edu.au/a/a8/sense.html last accessed on 16/08/2020)

Begault, D.R. 2008. Forensic analysis of the audibility of female screams. *AES 33rd International Conference, Denver, CO, USA, 2008 June 5,6,7* Table 2

Bellot-Gurlet, L., Poupeau, G., Salomon, J., Calligaro, T., Moignard, B., Dran, J-C, Barrat, J-A. & Pichon, L. 2005. Obsidian provenance studies in archaeology: A comparison between PIXE, ICP-AES and ICP-MS. *Nuclear Instruments and Methods in Physics Research*, 240: 583–8

Belluomini, G. & Delital, L.1983. Datazione di una sequenza stratigrafica del villaggio neolitico di Santa Tecchia con i metodi del ^{14}C e della racemizzazione dell acido aspartico. In Cassano, S.M. & Manfredini, A. (eds), *Studi sul neolitico del Tavoliere della Puglia. Indagine territoriale in un'area-campione*: 265–8. BAR International Series 160. BAR, Oxford

Belova O. 2006. The event of seeing: a phenomenological perspective on visual sense-making. *Culture and Organisation,* 12(2): 93–107

Bender, B., Hamilton, S. & Tilley, C. 1997. Leskernick: Stone Worlds; Alternative Narratives; Nested Landscapes. *Proceedings of the Prehistoric Society,* 63: 147–78

Bender, B., Hamilton, S. & Tilley, C. 2007. *Stone Worlds: Narrative and Reflexivity in Landscape Archaeology* . Left Coast Press, Walnut Creek, CA

Berger, E.H., Neitzel, R. & Kladden, C.A. 2015, *Noise Navigator TM Sound Level Database with Over 1700 Measurement Values.* Department of Environmental Health Science, University of Michigan Ann Arbor, MI

Berggren, Å, 2010. Emotional aspects of a fen. *Archaeological Dialogues*, 17(2):164–7

Betts, Eleanor, 2003. The sacred landscape of Picenum (900–100 BC): towards a phenomenology of cult places. In Wilkins, J. & Herring, E. (eds), *Inhabiting Symbols: Symbol and Image in the Ancient Mediterranean*: 101–20. Accordia Research Institute, London

Biancofiore, F. 1957. Villaggio capannicolo a "Scamuso", Bari. *Archivio Storico Pugliese*, 10

Binder, D., & Maggi, R., 2001. Le Néolithique ancien de l'arc liguro-provençal. *Bulletin de la Societé Préhistorique Française*, 98: 411–22

Bintliff, J. 1999. Settlement and territory. In Barker, G. (ed.), *The Routledge Companion Encyclopaedia of Archaeology*: 505–45. Routledge, London

Bintliff, J. 2012. *The Complete Archaeology of Greece. From hunter-gatherers to the 20th century AD*. Wiley-Blackwell, Oxford & Malden, MA

Bloch, M. 1971. *Placing the Dead: tombs, ancestral villages, and kinship organisation in Madagascar*. Seminar Press, London

Boenzi, F., Caldara, M., Moresi, M and Pennetta, L. 2002. History of the Salpi lagoon-sabhka (Manfredonia Gulf, Italy). *Italian Journal of Quaternary Science*, 14(2), 93–104

Boenzi, F., Caldara, M., Pennetta, L. & Simone, O. 2004. Environmental aspects related to the physical evolution of some wetlands along the Adriatic coast of Apulia (Southern Italy): a review. *Journal of Coastal Research,* SI 39: 170–5

Boivin, N. & Owac, M. (eds) 2004. *Soils, Stones and Symbols: cultural perceptions of the mineral world.* University College London Press, Lodon

Bökönyi, S. 1977–1982. The Early Neolithic fauna of Rendina: a preliminary report. *Origini*, 11: 345–50

Bökönyi, S. 1983. Animal bones from the test excavations. In Cassano, S. & Manfredini, A., *Studi sul neolitico del tavoliere della Puglia*: 237–49. British Archaeological Reports International Series 160. Oxford

Borgognini Tarli, S. 1977–1982. Rendina: notizie antropologiche preliminari. *Origini*, 11: 333–6

Boschian, G. & Montagnari-Kokelji, E. 2000 Prehistoric shepherds and caves in the Trieste Karst (northeastern Italy): *Geoarchaeology*, 15: 331–71

Bourdonnec, F.-X. L., Delerue, S., Dubernet, S., Moretto, Ph., Calligaro, Th, Dran, J-C. & Poupeau, G. 2005. PIXE characterization of Western Mediterranean and Anatolian obsidians and Neolithic provenance studies. *Nuclear Instruments and Methods in Physics Research*, 240: 595–9

Bradford, J.S.P. 1949. 'Buried Landscapes' in Southern Italy. *Antiquity,* 23: 58–72

Bradford, J.S.P. 1950. The Apulia Expedition: an interim report. *Antiquity*, 24: 84–95

Bradford, J.S.P. 1957. *Ancient Landscapes. Studies in Field Archaeology*. Bell, London

Bradford, J.S.P. & Williams-Hunt, P.R. 1946. Siticulosa Apulia. *Antiquity*, 20: 191–200

Bradley, R. 1989. Darkness and light in the design of megalithic tombs. *Oxford Journal of Archaeology,* 8(3): 251–9

Bradley, R. 1998. *The Significance of Monuments*. Routledge, London

Brown, K.A. 1991a. A passion for excavation. Labour requirements and possible functions for the ditches of the 'villaggi trincerati' of the Tavoliere, Apulia. *Accordia Research Papers*, 2: 7–30

Brown, K.A. 1991b. Settlement distribution and social organisation in the Neolithic of the Tavoliere, Apulia. In Herring, E., Whitehouse, R. & Wilkins, J. (eds), *Papers of the Fourth Conference of Italian Archaeology. The Archaeology of Power part i*: 9–25. Accordia Research Centre, London

Brown, K, 1995. Social control or 'opium of the people'? The role of religion in the Neolithic of the Tavoliere. In Waldren, W H., Ensenyat, J. & Kennard, R.C. (eds), *Ritual, Rites and Religion in Prehistory, 3rd Deia Conference of Prehistory*: 183–93. BAR International Series 611. British Archaeological Reports, Oxford

Brown, K, 1997. Domestic settlement and the landscape during the Neolithic of the Tavoliere, S.E. Italy. In Topping, P. (ed.), *Neolithic Landscapes*: 125–37. Neolithic Studies Group Seminar Papers 2 Oxbow Monograph 86. Oxbow Books, Oxford

Brown, K. 1998. Nice aerial photo – shame about the site: a cautionary tale from the Tavoliere (S.E. Italy). *AARGnews*, 16: 21–2

Brown, K.A. 2004. Aerial Archaeology of the Tavoliere. The Italian Air Photographic Rceord and the Riley Archive. *Accordia Research Papers*, 9 (2001–2003): 123–46

Brown, K.A. & Alexander, C. 2014. Once is not enough: were there two Neolithic colonisations of southern Italy? A Bayesian analysis of the radiocarbon evidence. In Pearce, M. & Whitehouse, R. (eds), *Rethinking the Italian Neolithic*. Accordia Research Institute, London

Brown, K.A. Tykot, R.H. & Muntoni, I.M. 2018. Obsidian in the Tavoliere, Southeastern Italy – A first regional study. *Journal of Archaeological Science: Reports,* 20: 284–92. Corrigendum published in *JAS:R*

Brumm 2004. An axe to grind: symbolic considerations of stone axe use in ancient Australia. In Jones, A. & MacGregor, G. (eds), *Colouring the Past: the significance of colour in archaeological research*: 143–64. Berg, Oxford

Bull, M & Black, L. 2005 [original 2003]. Introduction. In Bull, M. & Black, L. (eds), *The Auditory Culture Reader.*: 1–18. Berg, Oxford & New York

Bullock, P., Fedoroff, N., Jongerius, A., Stoops, G., & Tursina, T., 1985. *Handbook for Soil Thin Section Description.* Waine Research Publication, Wolverhampton

Burbidge, C.I., Sanderson, D.C.W., Fülöp, R., 2008. Luminescence Dating of ditch and pitfills from Newry Ring Fort, Northern Ireland. *SUERC*, East Kilbride, 91ff

Caldara, M., Pennetta, L. & Simone, O. 2004. L'ambiente fisico nell'area dell'insediamento. In Cassano, S.M. & Manfredini, A. (eds), *Masseria Candelaro. Vita quotidiana e mondo ideologico in una comunità neolitica del Tavoliere*: 28–40. Claudio Grenzi Editore, Foggia

Caldara, M., Muntoni, I.M., Fiorentino, G., Primavera, M & Radina, F. 2011. Hidden Neolithic landscapes in Apulian Region. In Van Leusen, M., Pizziolo, G. & Sarti, L. (eds), *Hidden Landscapes of Mediterranean Europe. Cultural and Methodological Biases in Pre- and Protohistoric Landscape Studies*: 183–91. British Archaeological Reports, International Series 2320. Archaeopress, Oxford

Canti, M. 1997. An Investigation of Microscopic Calcareous Spherulites from Herbivore Dungs. *Journal of Archaeological Science,* 24(3): 219–31

Canti, M. 1999. The Production and Preservation of Faecal Spherulites: Animals, Environment and Taphonomy. *Journal of Archaeological Science*, 26(3): 251–58

Carsten, J. & Hugh-Jones, S. 1991. Introduction: about the house – Lévi-Strauss and beyond. In J. Carsten, J. & Hugh-Jones, S. (eds) *About the House: Lévi-Strauss and Beyond*: 1–46 Cambridge University Press, Cambridge

Cassano S.M. 1993. La facies Serra d'Alto: intensificazione delle attività produttive e aspetti del riuale. *Origini*, 17: 221–45

Cassano S.M. 2004. Rituali ed aspetti del culto. In Cassano, S. & Manfredini, A. (eds), *Masseria Candelaro. Vita quotidiana e mondo ideologico in una comunità neolitica del Tavoliere*: 486–91. Claudio Grenze Editore, Foggia

Cassano, S.M. & Manfredini, A. (eds) 1983. *Studi sul neolitico del Tavoliere della Puglia. Indagine territoriale in un'area-campione*. BAR International Series 160. BAR, Oxford

Cassano, S.M. & Manfredini, A. 1987. Neolitico. In Cassano, S.M. , Cazzella, A., Manfredini, M., & Moscoloni, M. (eds), *Coppa Nevigata e il suo territoerio. Testimonianze archeologiche dal VII al II millennio a.C.*: 29–93

Cassano, S.M. & Manfredini, A. 1991. Rinvenimento di una sepoltura Serra D'Alto a Masseria Candelaro. Scavo 1990. 12° *Convegno Nazionale sulla Presitoria–Protostoria–Storia della Daunia. San Severo 14-15-16 dicemnbre 1990*: 31–6. Archeoclub, San Severo

Cassano, S. & Manfredini, A. (eds) 2004. *Masseria Candelaro. Vita quotidiana e mondo ideologico in una comunità neolitica del Tavoliere*. Claudio Grenze Editore, Foggia

Cassano, S. & Muntoni, I.M. 2004. La frequenza del villaggio nel tempo. In Cassano, S. & Manfredini, A. (eds) *Masseria Candelaro. Vita quotidiana e mondo ideologico in una comunità neolitica del Tavoliere*: 87–91. Claudio Grenze Editore, Foggia

Cassano, S.M, Cazzella, A., Manfredini, A. & Moscoloni, M. 1987. *Coppa Nevigata e il suo territorio. Testimonianze archeologiche dal VII al II millennio a.C*. Edizioni Quasar, Rome

Castelletti, L., Costantini, L. & Tozzi, C. 1987. Considerazioni sull'economia e lambiente durante il Neolitico in Italia. *Atti della XXVI Riunione Scientifica dell'Istituto Italiano di Preistoria e Protostoria (Firenze 7-10 Novembre 1985)*: 37–55. Istituto Italiano di Preistoria e Protostoria, Florence

Cecil, L.G., Moriarty, M.D., Speakman, R.J. & Glascock, M.D. 2007. Feasibility of Field-Portable XRF to Identify Obsidian Sources in Central Petén, Guatemala. In Glascock, M.D., Speakman, R.J. & Popelka-Filcoff, R.S. (eds), *Archaeological Chemistry: Analytical Methods and Archaeological Interpretation*: 506–21. ACS Publication Series 968. American Chemical Society, Washington, DC

Chadwick, A. 2003. Post-processualism, professionalization and archaeological methodologies: towards reflective and radical practice. *Archaeological Dialogues*, 10(1): 97–117

Chavin de Huantar Archaeological Acoustics Project. 2012. Edited by Miriam Kolar. https://ccrma.stanford.edu/groups/chavin/index.html, Accessed November 7th, 2012

Chisholm, M. 1962. *Rural Settlement and Land Use*. Hutchinson & Co., London

Ciaraldi, M. 2004. Paleobotanica. In Cassano, S.M. & Manfredini, A. (eds), *Masseria Candelaro. Vita quotidiana e mondo ideologico in una comunità neolitica del Tavoliere*: 447–60. Claudio Grenzi Editore, Foggia

Ciarico, A. 2004. I manufatii in pietra. In Cassano, S. & Manfredini, A. (eds), *Masseria Candelaro. Vita quotidiana e mondo ideologico in una comunità neolitica del Tavoliere*: 365–70. Claudio Grenze Editore, Foggia

Cipolloni Sampò, M. 1977–1982. Scavi nel villaggio neolitico di Rendina (1970–1976). *Origini*, 11: 183–323

Cipolloni Sampò, M. 1980. Le comunità neolitiche: proposta di lettura di un'analisiterritoriale. In *Attività archeologica in Basilicata 1964–1977. Scritti in onore di D. Adamesteanu*: 283–311. Edizioni META, Matera

Classen, C., 1993. *Worlds of Sense. Exploring the senses in history and across cultures*. Routledge, London & New York

Classen, C. 1998. *The Color of Angels: Cosmology, Gender and the Aesthetic Imagination*. Routledge, London & New York

Classen, C. (ed.) 2005. *The Book of Touch*. Berg, Oxford & New York

Classen, C. 2012. *The Deepest Sense: a cultural history of touch*. University of Illinois Press, Urbana

Conati Barbaro, C. 2011–2013. Forme di aggregazione sociale e uso del territorio nel Tavoliere di Puglia. *Rivista di Studi Liguri*, 77–79: 111–7

Cooney, G. 2000. *Landscapes of Neolithic Ireland*. Routledge, London

Coppola, D. 1986. La comunità neolitica di Scamuso. Torre a Mare, Bari. *Rivista di Antropologia*, 64: 17–48

Costantini, L. & Stancanelli, M. 1994. La preistoria agricola dell'Italia centro-meridionale: il contributo delle indagini archeobotaniche. *Origini*, 18: 149–244

Courty, M.A., 2001. Microfacies analysis assisting archaeological stratigraphy. In Goldberg, P., Holliday, V.T., & Ferring, C.R. (eds), *Earth Sciences and Archaeology*: 205–39. Kluwer, New York

Courty, M.A., Goldberg, P., & Macphail, R.I., 1989. *Soils and Micromorphology in Archaeology*. Cambridge University Press, Cambridge

Craig, N., Speakman, R. J., Popelka-Filcoff, R. S., Glascock, M. D., Robertson, J. D., Shackley, M. S. & Aldenderfer, M.S. 2007. Comparison of XRF and PXRF for analysis of archaeological obsidian from southern Peru. *Journal of Archaeological Science* 34: 2012–24

Cramer, G. 2013. U.S. Army Scorpion Camouflage. HyperStealth Biotechnology Corp. http: www.hyperstealth.com/scorpion/ accessed 09/10/2017

Cremonesi, G. 1973. Il villaggio di Ripoli alla luce dei recenti scavi. Nota preliminare. *Bollettino del Centro Camuno di Studi Preistorici*, 10: 79–88

Cummings, V. 2002. Experiencing texture and transformation in the British Neolithic. *Oxford Journal of Archaeology*, 21(3): 249–61

Cummings, V. 2003. Building from memory: remembering the past at Neolithic monuments in western Britain. In Williams, H. (ed.) *Archaeologies of Remembrance. Death and memory in past societies*: 25–43. Kluwer/Plenum, New York

Cummings, V. & Johnston, R. (eds) 2007 *Prehistoric Journeys*. Oxbow Books, Oxford

Cummings, V. & Whittle, A. 2004. *Places of Special Virtue. Megaliths in the Neolithic landscapes of Wales*. Oxbow Books, Oxford

Cuomo di Caprio, N. 1985. *La ceramica in archeologia. Antiche tecniche di lavorazione e moderni metodi d'indagine*. L'Erma di Bretschneider, Rom

Curci, A., Facciolo, A., Tagliacozzo, A & Minniti, C. 2004. Archeozoologia. In Cassano, S.M. & Manfredini, A. (eds), *Masseria Candelaro. Vita quotidiana e mondo ideologico in una comunità neolitica del Tavoliere*: 401–44. Claudio Grenzi Editore, Foggia

Dams, L. 1985. Palaeolithic Lithopohones: descriptions and comparisons. *Oxford Journal of Archaeology*, 4:31–46

Danby C. 1987. The skeletal material from Passo di Corvo. In Jones, J.D.B. *Apulia, Vol. I: Neolithic Settlement in the Tavoliere*: 206–7. Society of Antiquaries of London, London

Danese, M, Masini, N, Biscione, M, & Lasaponara, R, 2013. GIS and archaeology: a spatial predictive model for Neolithic sites of the Tavoliere (Apulia). In Hadjimitis, D.G. (ed.), *Procedings of SPIE 8795, First International Conference on Remote Sensing and Geoinformation of the Environment*, 87950I. Bellingham, Washington

Dawson, P., Levy, R., Gardner, D. & Wallis, M. 2007. Simulating the behaviour of light inside Arctic dwellings: implications for assessing the role of vision in task performance. *World Archaeology*, 39(1):17–35

Deakin, R. 2008. *Wildwood. A journey through trees*. Penguin, London

Debono Spiteri, C. 2012. *Pottery use at the transition to agriculture in the western Mediterranean. Evidence from biomolecular and isotopic characterisation of organic residues in Impressed/Cardial Ware vessels. A thesis submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy.* University of York Department of Archaeology (unpublished)

De Francesco, A. M., Crisci, G. M., & Bocci, M. 2008. Non-Destructive Analytic method using XRF for determination of provenance of archaeological obsidians from the Mediterranean area: A comparison with traditional XRF methods. *Archaeometry*, 50: 337–50

Deith, M.R. 1987. La raccolta di molluschi nel Tavoliere in epoca preistorica. In, Cassano, S.M., Cazzella, A., Manfredini, A. & Moscolonii, M. (eds), *Coppa Nevigata el il suo territorio. Testimonianze archeologiche dal VII al II millennio a.C.*: 101–6. Edizioni Quasar, Rome

De Juliis, E.M. 1972. Scavo di una capanna preistorica in località "Casone" (S.Severo, Foggia). *Rivista di Scienze Preistoriche*, 27: 117–44

De Juliis, E.M. 1975. Gli scavi del villaggio di Contrada Casone presso S. Severo. *Atti del Colloquio Internazionale sulla Preistoria e Protostoria della Daunia*: 122–9. Istituto Italiano di Preistoria e Protostoria, Florence

Delano Smith, C. 1975. Tipi di insediamenti nella zona costiera di Foggia. *Atti del Colloquio Internazionale sulla Preistoria e Protostoria della Daunia*: 5–22. Archeoclub, San Severo

Delano Smith, C. 1976. The Tavoliere of Foggia (Italy): an aggrading coastland and its early settlement patterns. *Geoarchaeology: Earth Science and the Past*: 197–211. Duckworth, London

Delano Smith, C. 1978. *Daunia Vetus: Terra, Vita e Mutamenti sulle Coste del Tavoliere*. Amministrazine Provinciale, Foggia

Delano Smith, C. 1979. *Western Mediterranean Europe. A Historical Geography of Italy, Spain and Southern France since the Neolithic*. Academic Press, London & New York

Delano Smith, C. 1983. L'ambiente. In Tiné, S. (ed.), *Passo di Corvo e la civiltà neolitica del Tavoliere*: 11–21. Sagep Editrice, Genoa

Delano Smith, C. 1987. Chapter 1: The Neolithic Environment of the Tavoliere. In Jones, J.D.B. *Apulia, Vol. I: Neolithic Settlement in the Tavoliere*: 1–26. Society of Antiquaries of London, London

Denston, C.B. 1987. The skeletal material from Fonteviva. In Jones, J.D.B. *Apulia, Vol. I: Neolithic Settlement in the Tavoliere*: 207–10. Society of Antiquaries of London, London

Devereux, P. 2009. A ceiling painting in the Hal Saflieni hypogeum as acoustically-related imagery: a preliminary note. *Time and Mind*, 2(2): 225–31

Devereux, P. *et al*. 1995. Acoustical properties of ancient ceremonial sites. *Journal of Scientific Exploration*, 9: 438

Devereux, P. & Jahn, R.G. 1996. Preliminary investigation and cognitive considerations of the acoustical resonances of selected archaeological sites. *Antiquity*, 70: 665–6

Di Lernia, S. 1993. L'indicatore ceramico nell'archeologia mineraria: il caso studio della Defensola. *Rassegna di Archeologia*, 11: 45–65

Di Lernia, S. 1996. Gargano. In Tinè, V. (ed.), *Forme e tempi della neolizzazione in Italia meridionale e in Sicilia. Atti del seminario internazionale Rossano, 29 aprile–2 maggio 1994*: 168–77. IRACEB & IIAS. Rubbettino, Soveria Mannelli (Catanzaro)

Di Lernia, S., Fiorentino, G. & Galiberti, A. 1990–91. 'Gargano Prehistoric Flint Mines Project': the state of research in the neolithic mine of Defensola – Vieste (Italy). *Origini*, 15: 175–99

Di Lernia, S., Fiorentino, G. & Galiberti, A. 1995. The early neolithic mine of Defensola 'A': flint exploitation in the Gargano area (I18). *Archaeologia Polona*, 33: 119–32

Di Lernia, S., Fiorentino, G. & Galiberti, A. 1996. Defensola. In Tinè, V. (ed.), *Forme e tempi della neolizzazione in Italia meridionale e in Sicilia. Atti del seminario internazionale Rossano, 29 aprile–2 maggio 1994: 115–20*. IRACEB & IIAS. Rubbettino, Soveria Mannelli (Catanzaro)

Di Lernia, S., Fiorentino, G. & Galiberti, A. 1997. Topography of Gargano mining sites between geological context and quarrying techniques: a preliminary investigation. *Siliceous Rocks and Culture* (Madrid 1991): 195–209

Di Rita, F., Simone, O., Caldara, M., Gehrels, W.R. & Magri, D. 2011. Holocene environmental changes in the coastal Tavoliere Plain (Apulia, southern Italy): a multiproxy approach. *Palaeogeography, Palaeoclimatology, Palaeoecology*, 310 (3–4): 139–51

D'Oronzo, C. & Fiorentino, G. 2006. Analisi archeobotaniche preliminare dei resti carpologici rinvenuti nel villaggio neoliticvo di Foggia (località ex-Ippodromo) *Atti del 26º Convegno sulla Preistoria - Protostoria e Storia della daunia*: 33–8. Archeoclub, San Severo

D'Oronzo, Gaglione, L. & Fiorentino, G. 2008. L'analisi archeobotanica condotta nel sito neoliticvo di Foggia in località Monte Cavello. *Atti del 28º Convegno sulla Preistoria - Protostoria e Storia della daunia*: 49–56. Archeoclub, San Severo

D'Ottavio, F. 2001. La caratterizzazione chimica della selce delle miniere preistoriche del Gargano. Proposta di un metodo archeometrico basato sulle analisi chimiche eseguite con la tecnica strumentale ICP-AES. *Origini*, 23: 111–43

Douglas, M. (ed.) 1984. *Food in the Social Order: studies of food and festivities in three American communities*. Russel Sage Foundation, New York

Douglas, M. & Nicod, M. 1974. Taking the biscuit: the structure of British meals. *New Society,* 30: 744–7

Douny, L. 2014. *Living in a Landscape of Scarcity. Materiality and Cosmology in West Africa*. Institute of Archaeology Publications 63. Left Coast Press, Walnut Creek, CA

Drewett, P. 1994. V. Seton Williams' Excavations at Combe Hill. *Sussex Archaeological Collections*, 132: 7–24

Drewett, P. , Ellison, A.B., Cartwrght, C.R., Hinton, P. & O'Connor, T.P. 1982 Later Bronze Age downland economy and excavations at Black Patch, East Sussex, *Proceedings of the Prehistoric Society* 48: 321–400

Drewett, P. & Hamilton, S. 1999. Marking time and making space. Excavations and landscape studies at the Caburn hillfot, East Sussex, 1996–98. *Susses Archaeological Collections*, 137: 7–37

Duffy, M. & Wait, G. 2011. Sound Diaries: a method of listening to place. *Aether, The Journal of Media Geography,* 7: 119–36

Eade, J. & Sallnow, M.J. (eds) 1991. *Contesting the Sacred: The Anthropology of Christian Pilgrimage*. Routledge, London & New York

Edgeworth, M. (ed) 2006. Ethnographies of *Archaeological Practice: Cultural Encounters. Material Transformations*. AltaMira Press, Lanham, Maryland

Edgeworth, M. 2008. Excavation of a Romano-British Enclosure Complex at Burton Wold Farm, Burton Latimer, Northamptonshire. *Northamptonshire Archaeology,* 35: 27-43

Eglash, R. 1998. Fractals in African settlement architecture. *Complexity*, 4: 21–9

Eglash, R.& Odumoso, T.B. 2005. Fractiles, complexity and connectivity in Africa. In Sica, G. (ed.), *What Mathematics from Africa?*: 4: 101–9. Polemetrica International Scientific Publisher, Monza

Elster, E., Robb, J., Isetti, E. & Traverso, A. 2016. *The Archaeology of Grotta Scaloria. Ritual in Neolithic Southeast Italy.* Monumenta Archaeologica 38. UCLA Cotsen Institute of Archaeology Press, Los Angeles, CA

Evans, J. & O'Connor, T. 1999. *Environmental Archaeology. Principles and Methods*. Sutton, Stroud

Fahlander, F. & Kjellstrom, A. (eds) 2010. . *Making sense of things. Archaeologies of sensory perception*. Postdoctoral Archaeological Group, Department of Archaeology and Classical Studies, Stockholm University, Stockholm

Farr, H. 2006. Seafaring as social action. *Journal of Marine Archaeology,* 1:85–99

Feld, S. 1996. Waterfalls of Sound: an Acoustemology of Place Resounding in Bosavi, Papua New Guinea. In Feld, S.& Basso, K. H.(eds), *Senses of Place*: 91–137. School of American Research Advanced Seminar Series, Santa Fe

Feld, S. 2005 Places sensed, senses placed: towards a sensuous epistemology of environments. In Howes, D. (ed.), *Empire of the Senses: the Sensual Culture Reader*: 179–91. Berf, Oxford & New York

Felleman, J.P, 1986. Landscape visibility. In Smardon, R.C., Palmer, J.F., Felleman, J.P. (eds), *Foundations for Visual Project Analysis*: 48–62. Wiley., New York

Fiorentino, G., Caldara, M., De Santis, V., D'Oronzo, C., Muntoni, I.M., Simone, O., Primavera, M. & Radina, F. 2013. Climate changes and human-environement interactions in the Apulia region of southeastern Italy during the Neolithic period. *The Holocene*, 23(9):m 1298–316

Fiorentino, G. & D'Oronzo, C. 2016. Archaeobotanical Analysis: Palaeoenvoronmental Implications. In Elster, E.S., Isetti, E., Robb, J. & Traverso, A. (eds), *The Archaeology of Grotta Scaloria. Ritual in Neolithic Sourheast Italy*: Chapter 3.2. Cotsen Institute of Archaeology Press, Los Angeles

Fisher, P., Wood, J. & Cheng, T. 2004. Where is Helvellyn? Fuzziness of multi-scale landscape morphometry. *Transactions of the Institute of British Geographers,* N.S. 29(1): 106–28

Fitzjohn, M. 2007. A cognitive approach to an upland landscape. In Fitzjohn, M. (ed.), Uplands of Ancient Sicily and Calabria; the archaeology of landscape revisited: 143–55. *Accordia Research Institute,* London

Fitzpatrick 1994. Outside in: the structure of an Early Iron Age house at Dunston Park, Thatcham, Berkshire. In Fitzpatrick, A. & Morris, E. (eds). *The Iron Age in Wessex: Recent Work*: 68–73. Trust for Wessex Archaeology, Salisbury

Fleming, A. 2005. Megaliths and postmodernism: the case of Wales. *Antiquity*, 79: 921–32

Follieri, M. 1977–1982. Le più antiche testimonianze dell'agricoltura neolitica in Italia meridionale. *Origini*, 11: 337–43

Follieri, M. 1983 Resti di piante alimentari: cereali e leguminose. In Tinè, S., *Passo di Corvo e la civiltà neolitica del Tavoliere*: 158–60. Sagep, Genova

Freestone, I.C., Meeks, N.D. & Middleton, A.P., 1985. Retention of phosphate in buried ceramics: an electron microbeam approach. *Archaeometry*, 27, 2: 161–77

Freund, K.P. & Tykot, R.H. 2011. Lithic Technology and Obsidian Exchange Networks in Bronze Age Nuragic Sardinia (Italy). *Archaeological and Anthropological Sciences*, 3: 151–64

Frieman, C. & Gillings, M, 2007. Seeing is Perceiving? *World Archaeology*, 39(1): 4–16

Fugazzola Delpino, M.A., Pessina, A. & Tiné, V. (eds), *Le ceramiche impresse nel Neolitico antico. Italia e Mediterraneo*. Studi di Paletnologia I, Collana del Bullettino di Paletnologia Italiana. Istituto Polografico e ecca dello Stato, Rome

Galiberti, A. 1984a. Scoperta di una miniera preistorica presso Vieste (Foggia) – Relazione preliminare. Atti 3° *Convegno Nazionale sulla Preistoria–Protostoria–Storia della Daunia. San Severo*: 73–84. Archeoclub, San Severo

Galiberti, A. 1984b. La miniera preistorica della Defensola in Vieste. *La ricerca archeologica nel territorio garganico. Atti del Convegno di Stud, Vieste 1982*: 115–30

Galiberti, A. 1999. Scavo di un area di débitage all'interno di una miniera di selce: proposta di un metodo. *Rassegna di Archeologia*, 16: 97–107

Galiberti, A. 2002. Defensola, Puglia. In Fugazzola Delpino, M.A., Pessina, A. & Tiné, V. (eds), *Le ceramiche impresse nel Neolitico antico. Italia e Mediterraneo*: 559–68. Studi di Paletnologia I, Collana del Bullettino di Paletnologia Italiana. Istituto Polografico e ecca dello Stato, Rome

Galiberti, A., Sivili, S. & Tarantini, M. 2001. La miniera neolitica della Defensola (Vieste-Foggia): lo stato delle ricerche. *Origini*, 6: 29–154

Geertz, C. 1973. *The Interpretation of Cultures*. Basic Books, New York

Geertz, C. 1993 (original 1983). *Local Knowledge*: *further essays in interpretative anthropology*. Fontana Press, London

Geniola, A. & Sanseverino, R. 2010. Osservazione sui rapporti tra il Tavoliere e la Puglia centrale durante il Neolitico. *Atti del 30° Convegno Nazionale sulla Preistoria–Protostoria–Storia della Daunia. San Severo*: 25–50. Archeoclub, San Severo

Gernigon, K. 2016. Villages before houses? The neolithization of Europe reconsidered through the concept of the household, *Palethnologie* [on line], 8. Consulted 17/04/2020

Giddens, A. 1991. *Modernity and Self-Identity: Self and Society in the Late Modern Age*. Polity Press, Cambridge

Gillings, M, 2008. The Ecsegfalva Landscape: affordance and inhabitation. In Whittle, A. & Kovács, G. (eds), *The Early Neolithic on the Great Hungarian Plain: investigations of the Körös culture site of Ecsegfalva 23, Co. Békés*: 31–46. Institute of Archaeology, Hungarian Academy of Sciences, Budapest

Gillings, M, 2009. Visual affordance, landscape, and the megalithcs of Alderney. *Oxford Journal of Archaeology*, 28(4): 335–56

Gillings, M. 2012. Landscape Phenomenology, GIS and the role of affordance. *Journal of Archaeological Method and Theory*, 19(4): 601–11

Gimbutas, M. 1982. *The Goddesses and Gods of Old Europe*. Thames & Hudson, London

Goldberg, P., & Macphail, R.I. 2006. *Practical and Theoretical Geoarchaeology*. Oxford, Blackwell Science

Golding, J. 1971 [1959]. *Cubism: A History and an Analysis 1907-1914*. Faber, London

Gosden, C. 2004. Aesthetics, intelligence, and emotions. Implications for archaeology, in Demarrais, E., Gosden, C. & Renfrew, C. (eds), *Rethinking materiality: the engagement of mind with the material world*: 33–40 McDonald Institute for Archaeological Research, Cambridge

Gravina, A. 1975. Fossati e strutture ipogeiche dei villaggi neolitici in agro di San Severo. *Attualità archeologiche*: 9–46

Gravina, A. 1980. Annotazioni sui fossati e sulle strutture ipogeiche dei villggi neolitici della Daunia settentrionale. *Rivista di Scienze Preistoriche*, 35, 1–2: 339–55

Gravina, A. 1981. L'Eneolitico e l'età del Bronzo nel bacino del Basso Fortore e nella Daunia nord-occidentale. Cenni di topografia. *Atti del 2° Convegno Nazionale sulla Preistoria–Protostoria–Storia della Daunia. San Severo*: 115–83, Tav. XXXIX–LXXII. Archeoclub, San Severo

Gravina, A 1999. La Daunia centro-occidentale. Frequentazione, ambient territorio fra neolitico finale, eneolitico ed età del Bronzo., *Atti del 19° Convegno Nazionale sulla Preistoria–Protostoria–Storia della Daunia. San Severo*: 83–142. Archeoclub, San Severo

Gravina, A.. 2005. Il popolamento Neolitico della Daunia costiera, garganica e nella Valle del Fortore, *Rivista di Scienze Preistoriche*, 55: 489–500

Gravina, A. 2008a. Due statuine fittili da S.Matteo-Chiantinelle (Serracaprioloa, Foggia. *Bullettino di Paletnologia Italiana,* 97: 73–36

Gravina, A. 2008b. Prime annotazione sulle incisioni e le pitture rupestri in due grotte di Valle di Ividoro (Rignano Garganico, Foggia). *Atti del 28° Convegno Nazionale sulla Preistoria–Protostoria–Storia della Daunia. San Severo*: 129–50. Archeoclub, San Severo

Gravina, A. 2009. La frequentazione eneolitica in un comprensorio alle pendici del Gargano meridionale. *Origini*, 31: 103–28

Gravina, A. 2010. Osservazioni sui rapporti tra la Daunia, l'Abruzzo e l'opposta sonda ariatica nel V millennio. *Atti del 30° Convegno Nazionale sulla Preistoria–Protostoria–Storia della Daunia. San Severo*: 65–94. Archeoclub, San Severo

Gravina, A. 2013. L'eneolitico e l'età del Bronzo nel Gargano meridionale. La frequentazione nell'area centro-occidentale. *Atti del 34° Convegno Nazionale sulla Preistoria–Protostoria–Storia della Daunia. San Severo*: 165–86. Archeoclub, San Severo

Gravina, A. 2014. Manifestazioni di arte rupestre nella Valle del Sorbo (San Giovanni Rotondo - Foggia) – Nota preliminare. *Atti del 34° Convegno Nazionale sulla Preistoria–Protostoria–Storia della Daunia. San Severo*: 271–96. Archeoclub, San Severo

Gravina, A. & Mattioli, T. 2010. Cronologia e iconografia delle pitture e delle incisioni rupestri della Grotta del Riposo e della Grotta Pazienza (Rignano Garganico, Foggia). *Atti del 30° Convegno Nazionale sulla Preistoria–Protostoria–Storia della Daunia. San Severo*: 95–112. Archeoclub, San Severo

Grifoni, R. &, Tozzi, C.1996. Torre Sabea, Trasano, Ripa Tetta. In Tiné, V. (ed.), *Forme e tempi della neolitazzione in Italia meridionale e in Sicilia. Atti Seminario Internazionale Rossano, 29 aprile – 2 maggio 1994:* 442–8. Rubbettino, Catanzaro

Grima, R. 2003. Image, order and place in Late Neolithic Malta. In Wilkins, J. & Herring, E. (eds), *Inhabiting Symbols: Symbol and Image in the Ancient Mediterranean*: 29–41. Accordia Research Institute, London

Guaitoli, M. (ed.) 2003. *Lo Sguardo di Icaro. Le Collezioni dell'Aerofotototeca Nazionale per la Conoscenza del Territorio*. Campisano Editore, Rome

Guilaine, J., Simone, L. & Thommeret, Y. 1981. Datations C14 our le Néolithique du Tavoliere (Italie). *Bulletin de la Société Préhistorique Française*, 78: 154–60

Hallam, B.R., Warren, S.E. & Renfrew, C. 1976 Obsidian in the western Mediterranean: Characterisation by neutron activation analysis and optical emission spectroscopy. *Proceedings of the Prehistoric Society,* 42: 85–110

Hamilakis, Y. 2002 Embodiment and experience: introduction. In Hamilakis, Y., Pluciennik, M. &Tarlow, S. (eds) *Thinking Through the Body: Archaeologies of Corporeality*: 99–103. Kluwer/Plenum, New York

Hamilton, S. 1996. Reassessing archaeological illustration: breaking the mould. *Graphic Archaeology 1996*. Association of Archaeological Illustrators and Surveyors, Wakefield (West Yorks)

Hamilton, S. & Barrett, J. 2018. Theory in the Field. In Gardner, A., Lake, M. & Sommer, U. (eds), *Oxford Handbook of Archaeological Theory*. Oxford University Press, Oxford

Hamilton, S. & Manley, J. 2001. Hillforts, monumentality snd place: a chronological and topographic review of first millennium BC hillforts of south-east England. *European Journal of Archaeology*, 4(1): 7–42

Hamilton, S. & Whitehouse R. (with Brown, K., Combes, C., Herring, E. & Seager Thomas, M.) 2006a. Phenomenology in practice: towards a methodology for a 'subjective' approach. *European Journal of Archaeology,* 9 (1): 31–71

Hamilton, S. & Whitehouse, R. 2006b. Three senses of dwelling: beginning to socialise the Neolithic ditched villages of the Tavoliere, southeast Italy. *Journal of Iberian Archaeology,* 8: 159–84. (special issue, *Approaching 'Prehistoric and Protohistoric Architectures' of Europe from a 'Dwelling Perspective'*, edited by Vitor Oliveira Jorge)

Hamilton, S., Seager Thomas, M. & Whitehouse, R. 2011. Say it with stone: constructing with stones on Easter Island. *World Archaeology*, 43.2; 167–90

Hamilton, S., Seager Thomas, M. & Whitehouse, R. 2016. Sensory Worlds of Grotta Scaloria. In Elster, E.S., Isetti, E., Robb, J. & Traverso, A. (eds), *The Archaeology of Grotta Scaloria. Ritual in Neolithic Sourheast Italy*: Chapter 3.4. Cotsen Institute of Archaeology Press, Los Angeles

Hammer, Ø., Harper, D.A.T., & Ryan, P.D. 2001. PAST: Paleontological statistics software package for education and data analysis. *Palaeontologia Electronica,* 4(1): 1–9

Harris, S. 2008a. Exploring the materiality of prehistoric cloth types. In Cunningham, P., Heeb, J. & Paardekooper, R. (eds), *Experiencing Archaeology by Experiment. Proceedings of the Experimental Archaeology Conference, Exeter 2007*: 81–102. Oxbow Books, Oxford

Harris, S. 2008b. Textiles, cloth and skins: the problem of terminology and relationship. *Textile: The Journal of Cloth & Culture*, 6(3): 222–37

Harris, S. 2009. Smooth and cool, or warm and soft: investigating the properties of cloth in prehistory. *North European Symposium for Archaeological Textiles*, 10: 104–12

Harris, S. 2010. Cloth Cultures in Prehistoric Europe: project concept and approach. *Archaeological Textiles Newsletter*, 5: 30–1

Harris, S. 2014a. Cloth culture in the Middle Neolithic Square-mouthed Pottery culture of northern Italy, with special reference to basketry. *Accordia Research Papers*, 13 104– 30

Harris, S. 2014b. Sensible dress: the sight, sound, smell and touch of Late Ertebølle Mesolithic cloth types. *Cambridge Archaeological Journal*, 24(1): 37–56. (doi:10.1017/S0959774314000031,)

Harris, O. & Flohr Sorensen, T. 2010. Rethinking emotion and material culture. *Archaeological Dialogues,* 17.2: 145–63

Hashimoto, T., Nakagawa, T., Hong, D.G. & Takano, M., 2002. An automated system for both reading thermoluminescence and optically stimulated luminescence measurements. *Journal of Nuclear Science and Technology*, 39: 08–109

Hedges, R.E.M., Housley, R.A., Law, I.A. & Bronk, C.R. 1989. Radiocarbon dates from the Oxford AMS system: *Archaeometry* datelist 9. *Archaeometry*, 31: 207–34

Heidegger. M. 1971. Building, Dwelling, Thinking, from trans. by Alfred Hofstadter, *Poetry, Language, Thought*: 145–61. Harper Colophon Books, New York

Higgs, E.S. (ed.) 1972. *Papers in Economic Prehistory*. Cambridge University Press, Cambridge

Higgs, E.S. (ed.) 1975. *Palaeoeconomy*. Cambridge University Press, Cambridge

Hodder, I. 1990. *The Domestication of Europe: Structure and Contingency in Neolithic Societies*. Blackwell, Oxford, UK & Cambridge, MA

Hodder, I. 1999. *The Archaeological Process: an introduction*. Blackwell, Oxford

Hodder, I. (ed.) 2000. T*owards a Reflexive Method in Archaeology: the example at Çatalhöyük*. British Institute of Archaeology at Ankara. McDonald Institute for Archaeological Research, Cambridge:

Hodder, I. 2003. Archaeological Reflexivity and the "Local" Voice. *Anthropological Quarterly*, 76(1): 55–69

Holmes, K. & Whitehouse, R. 1998. Amthropomorphic figurines and the construction of gender in Neolithic Italy In Whitehouse, R.D. (ed.), *Gender and Italian Archaeology: Challenging the Stereotypes*: 95–126. Accordia Research Institute, London

Hoskins, W.G. 1955. T*he Making of the English Landscape.* Hodder & Stoughton, London

Houston, S. & Taube, K., 2000. An Archaeology of the Senses: perception and cultural expression in ancient Mesoamerica. *Cambridge Archaeological Journal,* 10(2): 261–94

Howes, D. 1987. Olfaction and transition: an essay on the ritual uses of smell, *Canadian Review of Sociology and Anthropology*, 24(3): 398–416

Howes, D. (ed.) 1991. *The Varieties of Sensory Experience*. University of Toronto Press, Toronto

Howes, D. & Classen, C. 2014. *Ways of Sensing. Understanding the senses in society.* Routledge, London & New York

Hurcombe, L. 2007a. A sense of materials and sensory perception in concepts of materiality, *World Archaeology*, 39: 532–45

Hurcombe, L. 2007b. *Archaeological Artefacts as Material Culture*, Routledge, London

Ingold, T. 1993. The temporality of the landscape. *World Archaeology*, 25(2): 152–74

Ingold, T. 2000. *The Perception of Environment: essays on livelihood, dwelling and skill.* Routledge Abingdon

Ingold, T. 2007. Earth, sky, wind and weather, *Journal of the Royal Anthropological Institute*, 13(s1): S19–S38

Ingold, T. & Vergunst, J.L.(eds) 2008. *Ways of Walking: Ethnography and Practice on Foot.* Routledge, London &New York:

Jackson, D. 2011. Scents of place: the dysplacement of a First Nations community in Canada. *American Anthropologist,* New Series, 113 (4): 606–61

Jarman, M.R., Bailey, G.N. & Jarman, H.N. (eds) 1982. *Early European Agriculture: its Foundations and Development*. Cambridge University Press, Cambridge

Jarman, M.R. & Webley, D. 1975. Settlement and land use in Capitanata, Italy. In Higgs, E. (ed.), *Palaeoeconomy*: 177–221. Cambridge University Press, Cambridge

Järviluoma, H., & Wagstaff, G. (eds), 2002. *Soundscape Studies and Methods*. Finnish Society of Ethnomusicology, Helsinki

Jay 1993. *Downcast Eyes: the denigration of vision in twentieth century French thought*. University of Californ ia Press, Berkeley

Johnson, M. 2012. Phenomenological approaches in Landscape Archaeology. *Annual Review of Anthropology,* 41: 269–84

Jones, A & Bradley, R. 1999. The significance of colour in European archaeology, *Cambridge Journal of Archaeology*, 9: 112–14

Jones, A. & MacGregor, G. (eds) 2002. *Colouring the Past. The significance of colour in archaeological research*. Berg, Oxford & New York

Jones, J.D.B. 1987. *Apulia, Vol. I: Neolithic Settlement in the Tavoliere*. Society of Antiquaries of London, London

Jütte, R. 2004. *History of the Senses: from antiquity to cyberspace*. Polity Press, Cambridge

Kanaana, S. 2005. The Arab Ear and the American Eye: a study of the role of the senses in culture. *Cultural Analysis*, 4:

Lake, MW, & Woodman, PE, 2003. Visibility studies in archaeology: a review and case study. *Environment and Planning B: Planning and Design* 30: 689–707

Lake, M.W., Woodman, P. E. & Mithen, S.J. 1998. Tailoring GIS software for archaeological applications: am example concerning viewshed analysis. *Journal of Archaeological Science*, 25: 27–38

Lambrugo, C. 2013. *Profumi di argilla: tombe con unguentari corinzi nella necropoli arcaica di Gela.* 'L'Erma' di Bretschneider, Rome

Lanbrugo, C. 2019. A multi-sensory approach to Aphrodite in the alsos of Sappho's fr. 2 Voight: from Crete to Lesbos. *Accordia Research Papers*, 15: 69–85

Lawson, G., Scarre, C., Cross, I. & Hills, C. 1998. Mounds, megaliths, music and mind: the acoustical properties and purposes of archaeological spaces. *Archaeological Review from Cambridge,* 12:111–34

Lehrhaupt, L. 1985. Processional aspects of Irish pilgrimage. *The Drama Review*, 29(3): 48–64

Linick, T.W. 1980. La Jolla natural radiocarbon measurements 1X. *Radiocarbon*, 22: 1034–44

Linick, T.W. 1980. La Jolla natural radiocarbon measurements 1X. *Radiocarbon*, 22: 1034–44

Linick, T.W. 1984. La Jolla natural radiocarbon measurements X. *Radiocarbon*, 26: 75–110

Llobera, M, 1996. Exploring the topography of mind: GIS, social space and archaeology. *Antiquity*, 70: 612–22

Llobera, M, 2001. Building past landscape perception with GIS: understanding topographic prominence. *Journal of Archaeological Science*, 28: 1005–14

Llobera, M, 2003. Extending GIS-based visual analysis: the concept of visualscapes. *International Journal of Geographical Information Science*, 17(1): 25–48

Llobera, M. 2012. Life on a Pixel: challenges in the development of digital methods within an 'nterpretive' landscape archaeology framework." *Journal of Archaeological Method and Theory*, 19(4): 495–509

Londoño W. 2014. Reflexivity in Archaeology. In: Smith C. (ed.), *Encyclopedia of Global Archaeology. Springer,* New York

Low, K.E.Y. 2005. Ruminations on smell as a sociocultural phenomenon. *Current Sociology,* 53 (3): 397–417

Luckett, H. 2007. *Antony Gormley: Blind Light.* Exhibition guide for Gormley's Blind Light exhibition at the Hayward 17th May–19th August 2007

Macfarlane, R. 2012. *The Old Ways: a journey on foot*. Hamish Hamilton, London

Macphail, R.I., Courty, M.A., Hather, J., & Wattez, J. 1997. The soil micromorphological evidence of domestic occupation and stabling activities. In Maggi, R. (ed.), *Arene Candide: a Functional and Environmental Assessment of the Holocene Sequence (Excavations Bernabò Brea–Cardini 1940–50)*: 53–88. Memorie dell'Istituto Italiano di Paleontologia Umana, Rome

Macphail, R.I. & Cruise, G.M., 2001, The soil micromorphologist as team player: a multianalytical approach to the study of European microstratigraphy. In Goldberg, P., Holliday, V., & Ferring, R. (eds), Earth Science and Archaeology: 241–67. Kluwer Academic/ Plenum Publishers, New York

McKenzie, D. 1923. *Aromatics and the Soul: a study of smells.* William Heinemann Ltd., London

Maggi, R., 1997. *Arene Candide: a Functional and Environmental Assessment of the Holocene Sequence (Excavations Bernabò Brea–Cardini 1940–50).* Memorie dell'Istituto Italiano di Paleontologia Umana, Rome

Malinowski, B. 1929. *The Sexual Life of Savages in North Western Melanesia,* Eugenics Publishing Company, London

Mallegni, F. & Fornaciari, G. 1979. I resti scheletrici umani del villaggio neolitico del centro di Foggia, *Archivio per l'Antropologia e l'Etnologia*, 109: 461–96

Mallory, J. P. (ed.) 1984–87. Lagnano da Piede I. An early Neolithic village in the Tavoliere. *Origini*, 13: 193–290

Malone C. 1985. Pots, Prestige and Ritual in Neolithic Southern Italy. In Malone, C. & Stoddart, S. (eds), P*apers in Italian Archaeology IV. Part ii prehistory*: 118–51. British Archaeological Reports International Series 224. Oxford

Manfredini, A. 1968. Villaggio trincerato a Monte Aquilone (Manfredonia). *Origini*, 2: 65–101

Manfredini, A. 1972. Il villaggio trincerato di Monte Aquilone nel quadro del neolitico dell'Italia meridionale. *Origini*, 6: 29–153

Marcolongo, B. & Palmieri, A,M. 1990–1991. Aspetti geomorfologici ed insediamentali ne Neolitico del Tavoliere. *Origini,* 15: 219–29

Marry, S. 2010. Spatial and sonic evaluation of urban public ambiances. *Journal of Acoustic Ecology,* 10(1): 18–22

Marshall-Brown 1984–87. Lagnano da Piede I. An early Neolithic village in the Tavoliere. *Origini*, 13: 193–290

Mattioli, T., Farina, E., Armelloni, Ph., Hameau, M. & Diaz-Andreu, M. 2017. Echoing landscapes: echolocation and the placement of rock art in the Central Mediterranean. *Journal of Archaeological Science*, 83: 12–25

Mello, E. 1983. Indagini scientifiche per l'individuazione della provenienza dei manufatti di ossidiana. In Tiné, S. (ed.), *Passo di Corvo e la civiltà neolitica del Tavoliere*: 122–4. Sagep, Genova

Merleau-Ponty, M. 2004 [original Frernch edition 1944; translation by C. Smith]. *Phenomenology of Perception*. Routledge, London & New York

Midgley 2008. *The Megaliths of Northern Europe*. Routlege, Abingdon

Midgley 2010. Monuments and monumentality: the cosmological model of the world of megaliths, *Documenta Praehistorica*, 37, 55–64

Mills, S. 2004. Auditory archaeology at Çatalhöyük: preliminary research. *Project Archive 2004: Research Projects*. http://www.catalhoyuk.com/archive_reports/2004/ar04_40.html (Accessed 8/09/2011)

Mills, A. 2005a. *Applying Auditory Archaeology to Historic Landscape Characterisation*. www.cardiff.ac.uk/hisar/people/sm/aa_hlc/Text/AA_HLC_Report.pdf

Mills, S., 2005b. Sensing the place: sounds and landscape archaeology. In Bailey, D. Whittle, A. & Cummings, V. (eds), *(Un)settling the Neolithic*: 79–89. Oxbow, Oxford.

Mills, S. 2014 *Auditory Archaeology. Understanding sound and hearing in the past*. Left Coast Press, Walnut Creek, CA

Monaco, A. 2011. A simulation of farming and breeding activities: comparing the economic strategies in south east Italy neolithic communities. *Origini*, 33: 61–81

Monnet, R. n.d. *La Topographie, outil de la prospection*. Topographic drawing manual, privately circulated. (Acquired from Laurent Olivier: Chatillon, Burgudy 2000)

Morphy, H. 1992. *Ancestral Connections. Art and an Aboriginal system of knowledge*. University of Chicago Press, Chicago

Morter, J. & Robb, J. 1998. Space, gender and architecture in the southern Italian Neolithic. In Whitehouse, R.D. (ed.), *Gender and Italian Archaeology: Challenging the Stereotypes*: 83–94. Accordia Research Institute, London

Mosso, A. 1909. Stazione preistorica di Coppa Nevigata presso Manfredonia. *Monumenti Antichi dei Lincei,* 29

Muntoni, I., Laviano, R. & Radina, F. 2006. Materie prime e tecnologia di produzione per la ceramica di Serra d'Alto nelle Murge pugliesi. In Fabbri, B., Gualtireri, S. & Romito, M. (eds), *La ceramica in Italia quando l'Italia non c'era. Atti della 8a Giornata di Archeometria della Ceramica (Vietri sul Mare, 27-28 Aprile 2004)*: 89–97. Edipuglia. Bari

Muntoni, I.M., Genchi, F. & Scopece, N. 2012. Indagini archeologiche nel villaggio neolitico di Masseria Pantano (Foggia). Primi risultati. *Atti del 32⁰ Convegno Nazionale sulla Presitoris – Protostoria – Storia dell Daunia*: 3–14. Archeoclub, San Severo

Muntoni, I.M., Mironti, V. & Torre, M. 2018. Il Villaggio neolitico di Masseria Acquasalsa a Lucera (FG). *Atti del 38⁰ Convegno Nazionale sulla Presitoris – Protostoria – Storia dell Daunia*: 3–20 . Archeoclub, San Severo

Muntoni, I.M., Gravina, A. & Mironti, V. 2018. Evidenze archeologiche del Neolitico finale in loc. Tabanaro (San Severo, FG). *Atti del 38⁰ Convegno Nazionale sulla Presitoris – Protostoria – Storia dell Daunia*: 185–96. Archeoclub, San Severo

Murphy, C.P., 1986. *Thin Section Preparation of Soils and Sediments*. A B Academic Publishers, Berkhamsted

Natali, E. 2014. The earliest pottery in Italy: a technological approach to impressed decoration during the archaic phase. *The Old Potter's Almanack,* 19(2): 2–13

Natali, E. & Tiné, S. 2002. Guadone, Puglia. In Fugazzola Delpino, M.A., Pessina, A. & Tiné, V. (eds), *Le ceramiche impresse nel Neolitico antico. Italia e Mediterraneo*: 569–77. Studi di Paletnologia I, Collana del Bullettino di Paletnologia Italiana. Istituto Polografico e ecca dello Stato, Rome

Nazaroff, A.J., Prufer, K.M. & Drake, B.L. 2010. Assessing the applicability of portable X-ray fluorescence spectrometry of obsidian provenance research in the Maya Lowlands. *Journal of Archaeological Sciences*, 37: 885–95

Nisbet, R. 197–1982. Le analise archeobotaniche del villaggio neolitico della Villa Comunale (Foggia). *Origini*, 11: 175–81

Norberg-Schulz, C. 1980. *Genius Loci: towards a phenomenology of architecture.* Academy Editions, London

Nyberg, J. 2010. Peaceful sleep and heavenly celebration for the pure and innocent. The sensory experience of death during the long eighteenth century. In Fahlander, F. & Kjellström, A. (eds) *Making sense of things. Archaeologies of sensory erception*: 15–33. Postdoctoral Archaeological Group, Department of Archaeology and Classical Studies, Stockholm University, Stockholm

Odetti, G. 1975. Foto aerea e villaggi neolitici del tavoliere. *Atti del Colloquio sulla Preistoria e Protostoria della Daunia, Foggia 24–9 aprile 1973*: 134–6. Florence

Odetti, G. 2008. Primi dati sulla revisione del materiale dei villaggi di S. Vito di Scaramella. *Atti del 28^{0} Convegno Nazionale sulla Presitoris – Protostoria – Storia dell Daunia*: 99–109. Archeoclub, San Severo

OECD. 2012. *Linking Renewable Energy to Rural Development*. OECD Green Growth Studies. OECD Publishing. http://dx.doi.org/10.1787/9789264180444-en

Orton, C. & Hughes, M. 2013. *Pottery in Archaeology.*, 2nd ed. Cambridge Manuals in Archaeology. Cambridge University Press, Cambridge

O'Sullivan, N. J., Teasdale, M.D., Mattiangeli, V., Maixner, F., Pinhasi, R., Bradley, D.G. & Zink, A. 2016. A whole mitochondria analysis of the Tyrolean Iceman's leather provides insights into the animal sources of Copper Age clothing. Scientific Reports. 2016/08/18/online. - http://dx.doi.org/10.1038/srep31279

Oswald, A. 1997. A doorway on the past: practical and mystical concerns in the orientation of roundhouse doorways. In Gwilt, A. & Haselgrove, C. (eds), *Reconstructing Iron Age Societies*: 87–95. Oxbow, Oxford

Papadopoulos, C., Hamilakis, Y. & Kyparissi-Apostolika, N. 2015. Light in a Neolithic dwelling: Building 1 at Koutroulou Magoula (Greece). *Antiquity*, 89: 1034–50

Paquette, D. 2004. *Describing the Contemporary Sound Environment: an analysis of three approaches, their synthesis and a case study of Commercial Drive West Vancouver B.C.* Web published MA Thesis. School of Communication Studies, Simon Fraser University, Vancouver B.C. Canada

Parker Pearson, M. 1996. Food, fertility and front doors in the first millennium BC. In Champion, T.C. & Collis, J.R. (eds). *The Iron Age in Britain and Ireland: recent trends*v 117–32. J.R. Collis Publications, Sheffield

Paterson, N. McCullagh 2006. *The Vernacular Architecture and Buildings of Stroud and Chalford*. Trafford Publishing, Oxford

Pearson, M. 2006. *'In Comes I': Performance, Memory and Landscape*. University of Exeter Press, Exeter.

Perlès, C. 2001. *The Early Neolithic in Greece.* Cambridge University Press, Cambridge

Pessina, A. & Tiné, V. 2008. *Archeologia del neolitico. L'Italia tra VI e IV millennio a.C*. Carocci editore, Rome

Petersøn, R. 2003. William Stukely: an eighteenth-century phenomenologist? *Antiquity*, 77: 394–400

Phillips, S. C. & Speakman, R.J. 2009. Initial Source Evaluation of Archaeological Obsidian from the Kuril Islands of the Russian Far East by Portable X-ray Fluorescence. *Journal of Archaeological Science*, 36: 1256-63

Pluciennik, M. 1994. Holocene hunter-gatherers in Italy. In Skeates, R. & Whitehouse, R. (eds), *Radiocarbon dating and Italian prehistory*: 45–59. Accordia Resarch Institute and British School at Rome, London

Pluciennik, M. 1997. Radiocarbon determinations and the Mesolithic-Neolithic transition in southern Italy. *Journal of Mediterranean Archaeology*, 10.2: 115–50

Pope, R.E. 2007. Ritual and the roundhouse: a critique of recent ideas on domestic space in later British prehistory. In Haselgrove, C.C. & Pope, R.E.(eds), *The Earlier Iron Age in Britain and the near Continent*: 204–28. Oxbow, Oxford

Porteous, J.D. 1985. Smellscape. *Progress in Human Geography,* 9(3): 356–78

Poolton, N.R.J., Bøtter-Jensen, L., Wintle, A.G., Jakobsen, J., Jørgensen, F. & Knudsen, K.L.,1994. A portable system for the measurement of sediment OSL in the field. *Radiation Measurements*, 23 (2/3): 529–32

Poupeau, G., Le Bourdonnec, F.X., Dubernet, S. & Delerue, S. 2009. Instrumental Methods of Obsidian Characterization and Prehistoric Obsidian Provenance Studies: The Current Status. In Sternke. F., Eigeland, L. & Costa, L-J. (eds), *Non-Flint Raw Material Use in Prehistory: Old prejudices and new directions*: 35–42. Archaeopress, Oxford

Preziosi, D. & Hitchcock, L. 1999. *Aegean Art and Architecture*. Oxford History of Art Series. Oxford University Press, Oxford

Proust, M. 1976 [reprint trans by CK Scott Moncrief, first published in English 1922] *Swann's Way Volume One: Remembrance of Things Past*: 58–62. Chatto & Windus, London

Puglisi, S.M. 1955. Industria microlitica nei livelli a ceramica impressa di Coppa Nevigata. *Rivista di Scienze Preistoriche*, 10: 19–37

Puglisi, S.M. 1975. Lo strato neolitico di Coppa Nevigata. *Atti del Colloquio sulla Preistoria e Protostoria della Daunia, Foggia 24–9 aprile 1973*: 112–16. Florence

Pye, E. (ed.) 2008. *The Power of Touch; handling objects in museum and heritage contexts*. Left Coast Press, Walnut Creek (CA)

Quagliati, Q. 1936. *La Puglia Preistorica*. Vecchi, Trani

Radcliffe, F.F. 2006. *Paesaggi sepolti in Daunia. John Bradford e la ricerca archeologica dal cielo 1945/1957.* Claudio Grenzi Editore, Foggia

Radina, F. 2002a. *La preistoria della Puglia. Paesaggi, uomini e tradizioni di 8000 anni fa.* Mario Adda Editore, Bari

Radina, F. 2002b. L'insediamento di Balsignano. In Radina, F. (ed.), *La preistoria della Puglia. Paesaggi, uomini e tradizioni di 8000 anni fa: 143–58.* Mario Adda Editore, Bari

Radina, F., Sivilli, S., Alhaique, F. Fiorentino, G. & D'Oronzo, C. 2011. L'insediamento neolitico nella media valle Ofantina: l'area di Palata (Canosa di Puglia). *Origini*, 33: 107–56

Radvansky, G., Krawietz, S., & Tamplin, A. 2011). Walking through doorways causes forgetting: Further explorations. *The Quarterly Journal of Experimental Psychology*, 64 (8): 1632–45 DOI: 10.1080/17470218.2011.571267

Rajala, U. & Mills, P. (eds) 2017. *Forms of Dwelling: 20 Years of Taskscapes in Archaeology*. Oxbow Books., Oxford

Ramsley, A. 1979. Camouflage Patters-Effects of Size and Colour. Report Number Natick/Tr-79/030. Natick US: Natick Research and Development Command

Ray, K. 2008. Transcending an archaeology of the visual: some spheres of implicated discourse in past material culture. In Thomas, J. & Oliveira Jorge, V. (eds), *Archaeology and the Politics Of Vision in a Post-Modern Context*. Cambridge Scholars Publishing, Newcastle upon Tyne

Ray, K. & Thomas. J. 2018. *Neolithic Britain. The Transformation of Social Worlds*. Oxbow Books, Oxford

Ray, H.R. 2014. *A John Donne Companion*. Routledge Revivals, Abingdon, Oxon & New Yory

Reese, D.S. 2016. Shell from the Grotta Scaloria. In Elster, E., Robb, J., Isetti, E. & Traverso, A. (eds), *The Archaeology of Grotta Scaloria. Ritual in Neolithic Southeast Italy*: Chapte 6.5. Monumenta Archaeologica 38. UCLA Cotsen Institute of Archaeology Press, Los Angeles, CA UCLA Cotsen Institute of Archaeology Press, Los Angeles, CA

Reichert, A. 2007. *Bast, rushes, stinging nettles: textile materials from the stone age. Archaeological Reconstructions by Anne Reichert.* www.museum-albersdorf.de/bast/annecatalogenglish.pdf. Museum für Archäologie und Ökologie, Dithmarschen

Rellini, U. 1919. I villaggi preistorici trincerati di Matera. Contributo allo studio delle origini delle fortificazioni. *Rivista di Antropologia*, 23: 57–89

Rellini, U. 1934. Rapporto preliminare sulle ricerche paleontologiche condotte sul Promontorio del Gargano. *Bullettino di Paletnologia Italiana*, 50–51: 1–59

Renewable Energy Systems. nd. *Bryn Llywelyn Wind Farm. Environmental State ment, Volume 1: Non Technical Summary.* http://www.brynllywelyn.co.uk/media/15989/000

Richards, C. 1993. Monumental choreography: architecture and spatial representation in late Neolithic Orkney. In Tllley, C. (ed.), *Interpretative Archaeology*: 143–78. Berg, Oxford

Richards, C. (ed.) 2005. *Dwelling among the monuments: the Neolithic village of Barnhouse, Maeshowe passage grave and surrounding monuments at Stenness Orkney*. McDonald Institute for Archaeological Research, Cambridge

Richards, C., 2005. The Ceremonial House 2 in C. Richards (ed.), *Dwelling Among the Monuments. The Neolithic village of Barnhouse, Maeshowe passage grave, and surrounding monuments at Stenness, Orkney*: 129–56

McDonald Institute Monograph, Cambridge

Richards, C. & Jones, R. (eds) 2016. *The development of neolithic house societies in Orkney: investigations in the Bay of Firth, Mainland, Orkney (1994–2014)*. Windgather Press, Havertown

Ridola, D. 1926. Le grandi trincee preistoriche di Matera. La ceramica e la civiltà di quell tempo. *Bullettino di Paletnologia Italiana*, 46: 134–74

Riley, D, 1992. New Aerial Reconnaissance in Apulia. *Papers of the British School at Rome*, 60, 291–307

Robb, J. 1994a. The Neolithic of peninsular Italy: Anthropological synthesis and critique. *Bullettino di Paletnologia Italiana*, 85: 189–214

Robb, J. 1994b. Burial and social reproduction in the Peninsular Italian Neolithic. *Journal of Mediterranean Archaeology*, 7: 29–75

Robb, J. 2007. *The Early Mediterranean Village. Agency, Material Culture, and Social Change in Neolithic Italy*. Cambridge University Press, Cambridge

Robb, J. 2016. Radiocarbon dating and absolute dating. In Elster, E., Robb, J., Isetti, E. & Traverso, A. (eds), *The Archaeology of Grotta Scaloria. Ritual in Neolithic Southeast Italy*: Chapte 2.3. Monumenta Archaeologica 38. UCLA Cotsen Institute of Archaeology Press, Los Angeles, CA

Robb, J., Elster, E.S., Isetti, E. & Traverso, A. 2016. Conclusions. In Elster, E., Robb, J., Isetti, E. & Traverso, A. (eds), *The Archaeology of Grotta Scaloria. Ritual in Neolithic Southeast Italy*: Chapte 2.3. Monumenta Archaeologica 38. UCLA Cotsen Institute of Archaeology Press, Los Angeles, CA

Robb, J., Mallegni, E. & Ronco, D. 1991. New human remains from the southern Italian Neolithic: Ripa Tetta and Latronico. *Rivista di Antropologia*, 69: 125–44

Robb, J. Elster, E.S., Isetti, E., Knüsel, C.J., Tafuri, M.A. & Traverso, A. 2015. Cleaning the dead: Neolithic ritual processing of human bone at Scaloria Cave, Italy. *Antiquity*, 89: 39–54

Robb, J. & Van Hove, D. 2003. Gardening, foraging and herding: Neolithic land use and social territories in Southern Italy. *Antiquity*, 77: 241–54

Robb, J. & Michelaki, K. 2012. Small things remembered: pottery decoration in Neolithic southern Italy. In Johannsen, N. Jessen, M. & Jessen, H.J. (eds), *Excavating the Mind*: 161–81. Aarhus University Press, Aarhus

Robin, C. 2002. Outside of houses: The practices of everyday life at Chan Nòohol, Belize. *Journal of Social Archaeology*, 2.2: 245–68

Robin, C. & Rothschild, N.A. 2002. Archaeological ethnographies: social dynamics of outdoor space. *Journal of Social Archaeology*, 2.2: 159–72

Rossbacher, LA, 1986. Nearest-Neighbour Analysis: a technique for quantitative evaluation of polygonal ground patterns. *Geografiska Annaler. Series A, Physical Geography*, 68(1/2), 101–5

Rossi, F. 2011. Fossati e sistemi di difesa tra analisi aerofotografica e indagine archeologica. Alcuni esempi dalla Puglia settentrionale (II-I millennio a.C.). *Revista d'Arqeologica de Ponent*, 21: 275–86

Rossi, G. 1983. Altre industrie in pietra. In Tiné, S. (ed.), *Passo di Corvo e la civiltà neolitica del Tavoliere*: 124–32. Sagep, Genova

Rowley-Conwy, P. 2017. Faunal remains and microstratigraphy: new information on the Early Neolithic occupation of Arene Candide. Paper given at the Central Mediterranean Prehistory Workshop, held at Durham University on 4th April 2017

Ryle, G. 1949. *The Concept of the Mind*. Hutchinson, London

Salvadei, L. & Macchiarelli, R. 1983. Studi antropologici. In Cassano, S.M. & Manfredini, A. (eds), *tudi sul neolitico del Tavoliere della Puglia. Indagine territoriale in un'area-campione*: 253–64. BAR International Series 160. BAR, Oxford

Sanderson, D. C. W. & Murphy, S. 2010. Using simple portable OSL measurements and laboratory characterisation to help understand complex and heterogeneous sediment sequences for luminescence dating. *Quaternary Geochronology*, 5, 299–305

Sanderson, D.C.W., Bishop, P., Stark, M.T., Spencer, J.Q. 2003. Luminescence dating of anthropogenically reset sediments from Angkor Borei, Mekong Delta, Cambodia. *Quaternary Science Reviews*, 22 (10–13): 1111–22

Sanderson, D.C.W., Bishop, P., Stark, M Alexander, S.. & Penny, D. 2007. Luminescence dating of canal sediments from Angkor Borei, Mekong Delta. Southern Cambodia *Quaternary Geochronology*, 2(1–4), 322–9

Sargent, A. 1983a. Exploitation, territory and economy in the Tavoliere of Apulia. In Cassano, S. & Manfredini, A. (eds), *Studi sul neolitico del tavoliere della Puglia*: 223–36. British Archaeological Reports International Series 160. Oxford

Sargent, A. 1983b. Neolithic plant remains from the Tavoliere of Apulia. In Cassano, S. & Manfredini, A. (eds), *Studi sul neolitico del tavoliere della Puglia*: 250–2. British Archaeological Reports International Series 160. Oxford

Sargent, A. 1986. *Settlement and economy in Neolithic and Bronze Age Apulia, south-east Italy*. Unpublished PhD thesis, University of Cambridge

Sargent, A. 1987. Relazioni sui resti paleobotanici di Coppa Nevigata. *Atti XXVI Riunione Scienticia del Istituto Italiano di Preistoria e Protostoria*: 761–4. Istituto Italiano di Preistoria e Protostoria, Florence

Sargent, A. 2001. Changing settlement location and subsistence in later prehistoric Apulia, Italy. *Origini*, 23: 145–68

Scarre, C. 2010. Megaliths, memory and the power of stones. In Calado, D. (ed.), *Monumental questions: prehistoric megaliths, mounds, and enclosures*: 91–6. Archaeopress, Oxford

Scarre, C. & Lawson, G. (eds) 2006. *Archaeoacoustics*. McDonald Institute Monographs, Cambridge

Schafer, R.M. 1977a. *Our Sonic Environment and the Soundscape. The tuning of the world.* Destiny Books, Rochester, Vt

Schafer, R. M., (ed.) 1977b. *European Sound Diary*. Volume 3 of Music of the University of Michigan: A.R.C. Publications, Vancouver

Schafer, R. M. (ed.) 1977c. *Five Village Soundscapes*. A.R.C. Publications, Vancouver

Schafer, R.M. 1994. *The Soundscape: our sonic environment and the tuning of the world*. Destiny Books, Rochester, Vermont (Originally published 1977 as *The tuning of the world*. Knopf, New York)

Seager Thomas, M. 2020. The WW2 Foggia Airfield Complex in the Bradford Archive of Aerial Reconnaissance Photographs. *Artefact Services Research Papers,* 10. https://archive.org/details/asrp-10-foggia-airfields-complex-2020 [accessed 22nd August 2020].

Service 1962. *Primitive Social Organisation*. Random House, New York

Shanks, M. 1992. *Experiencing the Past*. Routledge, London

Shennan, S 1997. *Quantifying Archaeology,* 2nd edition. Edinburgh University Press, Edinburgh

Shennan, S. 2018. *The First Farmers of Europe: an evolutionary perspective*. Cambridge University Press, Cambridge

Shepard, A. O. 1954. *Ceramics for the Archaeologist*. Carnegie Institution of Washington, Washington

Simone, L. 1977–1982. Il villaggio neolitico della Villa Comunalke di Foggia, *Origini*, 11 129–60

Skeates, R. 2000. The Social Dynamics of Enclosure in the Neolithic of the Tavoliere, South-east Italy. *Journal of Mediterranean Archaeology*, 13.2: 155–88

Skeates, R. 2003. Radiocarbon dating and interpretations of the Mesolithic-Neolithic transition in Italy. In Ammerman, A. & Biagi, P. (eds), *The Widening Harvest. The Neolithic Transition in Europe: Looking Back, Looking Forward:* 157–87 Archaeological Institute of America, Boston, Mass.

Skeates, R. 2010. *An Archaeology of the Senses: Prehistoric Malta*. Oxford University Press, Oxford

Skeates, R. 2012. Caves in need of context: prehistoric Sardinia. In Bergsvik, K.A. & Skeates. R. (eds), *Caves in Context: the cultural significance of caves and rockshelters in Europe*: 166–87. Oxbow Books, Oxford

Skeates, R. 2016. Experiencing darkness and light in caves: later prehistoric examples from Seulo in central Sardinia. In Dowd, M. & Hensey, R. (eds), *The Archaeology of Darkness*: 39–49. Oxbow Books, Oxford

Skeates, R. & Day, J. (eds) 2020. *The Routledge Handbook of Sensory Archaeology*. Routledge, London & New York

Smetana, F., Hajek, M., Bergmann, R., Brusl, H., Fugger, M., Gratzl, W., Kitz, E. & Vana, N., 2008. A portable multi-purpose OSL reader for UV dosimetry in the workplace. *Radiation Measurements* ,2008: 516–9

Smith, B.R. 2004. The soundscapes of early modern England. In Smith, M.M. (ed.), *Hearing History: a Reader*: 85–111. University of Georgia Press, Athens, Georgia

Smith, C. 2004. Preface to M. Merleau-Ponty, *Phenomenology of Perception* [2004 reprint]: vii-xxiv. Routledge, London & New York

Smith, J.A. 1931 (trans). On the Soul (*De Anima*) by Aristotle (written 350 BC). Internet Classics Archive (http://classics.mit.edu/Aristotle/soul.mb.txt, last accessed on 16/08/2020)

Sordoillet, D. 1997. Formation des dépôts archéologiques en grotte: la Grotte du Gardon (Ain) durant le Néolithique. In Bravard, J.-F., & Prestreau, M. (eds), *Dynamique du Paysage. Entretiens de Géoarchéologie*: 39–57. Volume Documents d'Archéologiques en Rhône-Alpes No. 15. Ministère de la Culture, Lyon

Sorrentino, C. 1983. La fauna. In Tinè, S., *Passo di Corvo e la civiltà neolitica del Tavoliere*: 149–57. Sagep, Genova

Spataro, M. 2002. *The First Farming Communities of the Adriatic: Pottery Production and Circulation in the Early and Middle Neolithic*. Quaderno 9. Società per la Preistoria e Protostoria della Regione Friuli-Venezia Giulia, Trieste

Spataro, M. 2009. The first specialised potters of the Adriatic region: the makers of Neolithic figulina ware. In Forenbaher, S. (ed.), *A Connecting Sea: Maritime Interaction in Adriatic Prehistory*: 59–72. British Archaeological Reports International Series 2037. Archaeopress, Oxford

Spataro, M. 2011. A comparison of chemical and petrographic analyses of Neolithic pottery from south-eastern Europe. *Journal of Archaeological Science*, 38(2): 255–69

Spataro, M. 2017. Innovation and regionalism in the Middle/Late Neolithic of south and south-eastern Europe (ca. 5500-4500 cal. BC): a ceramic perspective. In Burnez-Lanotte, L. (ed.), *Matières à Penser: Raw materials acquisition and processing in Early Neolithic pottery productions*. Séances de la Société préhistorique française, 11: 61–80. Société préhistorique française, Paris

Spataro, M. 2019. *Starčevo ceramic technology: the first potters of the Middle Danube Basin*. Universitätsforschungen zur prähistorischen Archäologie 341. Neolithikum und Chalkolithikum in Südosteuropa 4. Verlag Dr. Rudolf Habelt GmbH, Bonn

Speakman, R.J. 2012. *Evaluation of Bruker's Tracer Family Factory Obsidian Calibration for Handheld Portable XRF Studies of Obsidian.* Center for Applied Isotope Studies, The University of Georgia

Spencer, J.Q., Sanderson, D.C.W., Deckers, K., Sommerville, A.A., 2003. Assessing mixed dose distributions in young sediments identified using small aliquots and a simple 2 step SAR procedure: the F statistic as a diagnostic tool. *Radiation Measurements*, 37: 425–31

Stoops, G., 2003. *Guidelines for Analysis and description of Soil and Regolith Thin Sections*. Soil Science Society of America, Madison, Wisconsin

Sturt, F. 2007. Structured thoughts: CGI and reconstruction of a Chalcolithic structure. In Fitzjohn, M. (ed.), *Uplands of Ancient Sicily and Calabria: the archaeology of landscape revisited*: 81–98. Accordia Research Institute, London

Taçon P. 1991. The power of stone: symbolic aspects of stone use and tool development in western Arnhem Land, Australia. *Antiquity,* 65: 192–

Taçon P. 2008. Rainbow colour and power among the Waanyi of Northwest Queensland. *Cambridge Archaeological Journal*, 18(2): 163–76

Tafuri, M.A., Robb, J., Belcastro, M.G., Mariotti, V., Iacumin, P., Di Matteo, A. & O'Connel, T. 2014. Herding practices in the ditched villages of the Neolithci Tavoliere (Apulia, South East Italy): a vicious circle. The isotopic evidence. *Proceedings of the British Academy,* 198: 143–57

Tafuri, M.A., O'Connell, T., Souter, E., Libianchi, N. & Robb, J. 2016a. Diet during life: palaeoeconomic studies of human diet using stable carbon and nitrogen isotopes. In Elster, E.S., Isetti, E., Robb, J. & Traverso, A. (eds), *The Archaeology of Grotta Scaloria. Ritual in Neolithic Sourheast Italy*: Chapter 4.2. Cotsen Institute of Archaeology Press, Los Angeles

Tafuri, M.A., O'Connell, T., Robb, J., Knüsel, C. & Fullagar, P. 2016b. Mobility, landscape, and the function of the cave: evidence from strontium isotopes. In Elster, E.S., Isetti, E., Robb, J. & Traverso, A. (eds), *The Archaeology of Grotta Scaloria. Ritual in Neolithic Sourheast Italy*: Chapter 4.3. Cotsen Institute of Archaeology Press, Los Angeles

Tafuri, M.A., Fullagar, P.D., O'Connell, T.C., Belcastro, M.G. Iacumin, P., Conati Barbero, C., Sanseverino, R. & Robb, J. 2016c. Life and death in southeastern Italy: the strontium isotopic evidence. *International Journal of Osteoarchaeology*, 26: 1045–57

Tarantino, M. & Galiberti, A. 2012. Le miniere di selce preistoriche del Gargano alla luce delle ultime ricerche. *Atti del 32° Convegno Nazionale sulla Preistoria–Protostoria–Storia della Daunia. San Severo*: 59–74. Archeoclub, San Severo

Tarlow, S. 2000. Emotion in Archaeology. *Current Anthropology*, 41(5): 713–46

Tarlow, S. 2012. The Archaeology of Emotion and Affect *Annual Review of Anthropology*, 41: 169–85

Thedéen, S. 2010. Immortal maidens: the visual significance of the colour white in girls' graves on Viking-Age Gotland. In Fahlander, F. & Kjellström (eds), *Making Sense of Things: Archaeologies of perception*: 103–20. PAG Post Doctoral Archaeological Group. Stockholm Studies in Archaeology 53, Stockholm

Thomas, J. 1993. The politics of vision and the archaeologies of landscape. In Bender, B. (ed.), *Landscape, Politics and Perspectives*: Berg, Oxford

Thomas, J. 2008. On the ocularcentrism of archaeology. In Thomas, J. & Oliveira Jorge, V. (eds), *Archaeology and the Politics of Vision in a Post-Modern Context*: 1–12. Cambridge Scholars Publishing, Newcastle upon Tyne

Thomsen, K.J., Bøtter-Jensen, L., Jain, M., Denby, P., & Murray, A.S., 2008. Recent Instrumental developments for trapped electron dosimetry. Radiation Measurements, 43: 414–21

Till, R. 2017. An archaeoacoustic study of the Hal Saflieni Hypogeum on Malta. *Antiquity*, 91: 74–89

Tilley, C. 1993. Art, Architecture, Landscape (Neolithic Sweden). In Bender, B. (ed.), *Landscape. Politics and Perspectives*: 49–84. Berg, Oxford

Tilley, C. 1994. *A Phenomenology of Landscape: places, paths and monuments*. Berg, Oxford & Providence, RI

Tilley, C. 2004. *The Materiality of Stone. Explorations in Landscape Phenomenology*. Berg, Oxford & New York

Tilley, C. 2007. The Neolithic sensory revolution: monumentality and the experience of landscape. In Whittle, A. & Cummings, V. (eds.), *Going Over: the Mesolithic-Neolithic Transition in North-West Europe*: 329–45. Proceedings of the British Academy, 144, Oxford

Tilley, C. 2008. Phenomenological approaches to landscape archaeology. In David, B. & Thomas, J. (eds), *Handbook of Landscape Archaeology*: 271–6. Left Coast Press, Walnut Creek, CA

Tilley , C., Hamilton, S., & Bender, B. 2000. Art and the representation of the past. *The Journal of the Royal Anthropological Institute*, 6(1): 35–62

Tiné, S. 1968. Lo scavo di una capanna del villaggio neolitico di Passo di Corvo. *Atti XI e XII Riunione dell'Istituto Italiano di Preistoria e Protostoria*: 169–72. Istituto Italiano di Preistoria e Protostoria, Florence

Tiné, S. 1971. I villaggi neolitici nel territorio di Foggia (Puglia); la successione degli stili ceramici. *Actes VIII Congrès U.I.S.P.P. II*: 386–92

Tiné, S. 1972. Gli scavi nel villaggio neolitico di Passo di Corvo. *Atti XIV Riunione dell'Istituto Italiano di Preistoria e Protostoria*: 313–33. Istituto Italiano di Preistoria e Protostoria, Florence

Tiné, S. 1975a. La civiltà neolitica del Tavoliere. *Atti del Colloquio Internazionale sulla Preistoria e Protostoria della Daunia*: 99–111. Archeoclub, San Severo

Tiné, S. 1975b. Culto neolitico delle acque nella Grotta Scaloria. In Anati, E. (ed.), *Valcamonica Symposium 72. Actes du symposium international sur les religions de la préhistoire*: 185–90. Edizioni del Centro, Capo di Ponte

Tiné, S. 1983. *Passo di Corvo e la civiltà neolitica del Tavoliere*. Sagep, Genova

Tiné, S. 1999. Passo di Corvo e i mille villaggi neolitici del Tavoliere. In Tunzi Sisto, A.M. (ed.), *Ipogei della Daunia. Preistoria di un territorio*: 94–7. Claudio Grenzi Editore, Foggia

Tiné, S. & Bernabò Brea, M. 1980. Il villaggio neolitico del Guadone di San Severo (Foggia). *Rivista di Scienze Preistoriche*, 82 (1975–80): 31–70

Tiné, S. & Isetti, F. 1982. Culto neolitico delle acque nella Grotta Scaloria. *Bullettino di Paletnologia Italiana*, 35, 1-2: 45–74

Tiné, V. (ed.) 1996. *Forme e tempi della neolitazzione in Italia meridionale e in Sicilia. Atti Seminario Internazionale Rossano, 29 aprile – 2 maggio 1994.* Rubbettino, Catanzaro

Tongiorgi, E., Radmilli, M., Rinaldi Fornaca, G. & Ferrara, G. 1959. *Programma di datazioni con radiocarbonio delle culture italiane della preistoria recente in collaborazione con Istituto Italiano Preistoria e Protostoria: Laboratorio di Geologoia Nucleare, Pisa*. Mimeograph

Townend, S. 2007. What have reconstructed roundhouses ever done for us? *Proceedings of the Prehistoric Society,* 73: 97–111. doi:10.1017/S0079497X00027316

Tozzi, C. 1984. Il villaggio a ceramica impressa a Ripa Tetta (Lucera): ricerche preliminary. *Taras*, 4: 155–64

Tozzi, C. 1988a. Contributo alla conoscenza del villaggio neolitico di Ripa Tetta (Lucera). *Atti del 6° Convegno Internazionale sulla Preistoria, Protostoria e Storia della Daunia (San Severo 14-16 dicembre 1984)* vol. 1: 11–20. Archeoclub, San Severo

Tozzi, C. 1988b. Resti di un'abitazione neolitica nel villaggio a ceramica impressa di Ripa Tetta (Lucera). *Atti del 8° Convegno Internazionale sulla Preistoria, Protostoria e Storia della Daunia (San Severo 12-14 dicembre 1986)*: 45–52. Archeoclub, San Severo

Tozzi, C. 1993. Strutture d'abitato e ambiente nel Neolitico Italiano. *Atti del 13° Convegno Internazionale sulla Preistoria, Protostoria e Storia della Daunia (San Severo 22-24 novembre 1991)vol. 2*: 11–4. Archeoclub, San Severo

Tozzi, C. 2002. Ripa Tetta, Puglia. In Fugazzola Delpino, M.A., Pessina, A. & Tiné, V. (eds), *Le ceramiche impresse nel Neolitico antico. Italia e Mediterraneo*: 579–88. Studi di Paletnologia I, Collana del Bullettino di Paletnologia Italiana. Istituto Polografico e ecca dello Stato, Rome

Tozzi, C. & Tasca, G. 1989. Il villaggio neolitico di Ripa Tetta. I risultati delle ricerche 1988. *Atti del 10° Convegno Internazionale sulla Preistoria, Protostoria e Storia della Daunia (San Severo 17-18 dicembre 1988)*: 39–54. Archeoclub, San Severo

Tozzi, C. & Verola, L. 1991. La campagna di scavo 1990 a Ripatetta (Lucera, Foggia). *Atti del 12° Convegno Nazionale sulla Preistoria–Protostoria–Storia della Daunia. San Severo 1990*: 37–54. Archeoclub, San Severo

Trump, D. H. 1987. Chapter III. The Excavated Sites. In Jones, G.D.B, Apulia. *Vol I: Neolithic Settlement in the Tavoliere*: 117–72. Society of Antiquaries, London

Tschan, AP, Raczkowski, W, & Latalowa, M, 2000. Perception and viewsheds: are they mutually inclusive? In Lock, G. (ed.), *Beyond the Map: Archaeology and Spatial Technologies*: 28–48. IOS Press, Amsterdam

Tunzi Sisto, A.M. 1994. Foggia, 1. Villa Comunale; 2. Via Galliani. *Taras*, 14.1: 31–3

Tunzi Sisto, A.M. 1999. *Ipogei della Daunia. Preistoria di un territorio*. Claudio Grenzi Editore, Foggia

Tunzi Sisto, A.M. & Monaco, A. 2006. Il neolitico a Foggia. *Atti del 26° Convegno Nazionale sulla Preistoria–Protostoria–Storia della Daunia. San Severo*: 17–32. Archeoclub, San Severo

Tunzi Sisto, A.M., Danesi, M. & Simonetti, R. 2006. Il grande abitato di Troia. *Atti del 26° Convegno Nazionale sulla Preistoria–Protostoria–Storia della Daunia. San Severo*: 17–32. Archeoclub, San Severo

Tunzi Sisto, A.M., Monaco, A. & Simonetti, R. 2008 Lo scavo sistematico di un fossato a C.: il caso del villaggio neolitico di Monte Calvello. *Atti del 28° Convegno Nazionale sulla Preistoria–Protostoria–Storia della Daunia. San Severo*: 29–48. Archeoclub, San Severo

Tunzi Sisto, A.M. & Sanseverino, R. 2008a. Insediamento neolitico in località La Torretta (Poggio Imperiale – FG). *Atti del 28° Convegno Nazionale sulla Preistoria–Protostoria–Storia della Daunia. San Severo*: 71–86. Archeoclub, San Severo

Tunzi Sisto, A.M. & Sanseverino, R. 2008b. Nota preliminare sull'insediamento neolitico di C.no S.Matteo-Chiantinelle (Serracapriola – FG). *Atti del 28° Convegno Nazionale sulla Preistoria–Protostoria–Storia della Daunia. San Severo*: 71–86. Archeoclub, San Severo

Tunzi Sisto, A.M. & Sanseverino, R. 2010. Nuovi dati sulla neolitizzazione e sul popolamento dell'età del Bronzo nel Subappennino Dauno. *Atti del 30° Convegno Nazionale sulla Preistoria–Protostoria–Storia della Daunia. San Severo*: 113–26. Archeoclub, San Severo

Tunzi Sisto, A.M. & Monaco, A. 2010. Vacarella – Masseria Fragella (Lucera - FG): sepolture eneolitiche di facies Laterza. *Atti del 30° Convegno Nazionale sulla Preistoria–Protostoria–Storia della Daunia. San Severo*: 127–36. Archeoclub, San Severo

Tunzi Sisto, A.M. & Monaco, A. 2011 Le sepolture di facies Laterza in località Vaccarella, Lucera (FG). *Atti del 43° Riunione Scientifica I.I.P.P., Bologna*: 761–6

Tunzi Sisto, A.M., Lo Zupone, M. & Di Lieto, M. 2014. L'insediamento neolitici stagionale di Serra di Cristo (Biccari – FG). *Atti del 34° Convegno Nazionale sulla Preistoria–Protostoria–Storia della Daunia. San Severo*: 53–80. Archeoclub, San Severo

Tunzi Sisto, A.M. & Quero, T. 2016. New data on the Neolithic ditches of the Tavoliere area (Apulia, Southern Italy). In Danels, A. (ed.) *Monumnetal Earthen Architecture in Early Societies. Technology and Powere DiSplay 17th Congress of the IUPP, Burgo*s, volume 2, Session B3: 31–43. Archaeopress Archaeology, Oxford

Tunzi Sisto, A.M, Simonetti, R. & Monaco, A. 2017. Vivere, smaltire i rifiuti e seppellire i morti nei villaggi trincerati del Tavoliere pugliese: analisi funzionali dei fossati perimetrali nel sito di Masseria Fragella (Lucera). . In Radina, F. (ed.), *47 Riunione Scientifica Preistoria e Protostoria della Puglia*: 1–5. Istituto Italiano di Preistoria e Protostoria, Florence

Tunzi Sisto, A.M. & Gaspero, N. 2018. Abitato neolitico a Piano Morto (Candela - FG). *Atti del 38° Convegno Nazionale sulla Preistoria–Protostoria–Storia della Daunia. San Severo*: 129–500. Archeoclub, San Severo

Tunzi Sisto, A.M. & Lozupone, M. 2018. Biccari (Foggia) - Storie di "abitati minori" del Neolitico: la tomba della "signora" e l'atelier delle "veneri". *Atti del 38° Convegno Nazionale sulla Preistoria–Protostoria–Storia della Daunia. San Severo*: 111–28. Archeoclub, San Severo

Turner, V. 1967. *The Forest of Symbols: Aspects of Ndembu ritual.* Cornell University Press, Ithaca & London

Turner, V. 1969. *The Ritual Process: Structure and Anti-Structure.* Aldine Publishing, Chicago

Tykot, R.H. 1997. Characterization of the Monte Arci (Sardinia) Obsidian Sources. *Journal of Archaeological Science*, 24: 467–79

Tykot, R.H. 2002. Chemical Fingerprinting and Source-Tracing of Obsidian: The Central Mediterranean Trade in Black Gold. *Accounts of Chemical Research*, 35: 618–27

Tykot, R.H. 2010. Sourcing of Sardinian Obsidian Collections in the Museo Preistorico-Etnografico 'Luigi Pigorini' Using Non-Destructive Portable XRF. In Lugliè, C. (ed.), *L'ossidiana del Monte Arci nel Mediterraneo. Nuovi apporti sulla diffusione, sui sistemi di produzione e sulla loro cronologia. Atti del 5° Convegno internazionale (Pau, Italia, 27-29 Giugno 2008)*: 85–97. NUR, Ales

Tykot, R.H. 2011. Obsidian Finds on the Fringes of the Central Mediterranean: Exotic or Eccentric Exchange? In Vianello, A. (ed.), *Exotica in the Prehistoric Mediterranean*: 33–44. Oxbow Books, Oxford

Tykot, R.H. 2017a. Obsidian Studies in the Prehistoric Central Mediterranean: After 50 years, what have we learned and what still needs to be done? *Open Archaeology*, 3: 264–78

Tykot, R.H. 2017b. A Decade of Portable (Hand-Held) X-Ray Fluorescence Spectrometer Analysis of Obsidian in the Mediterranean: Many advantages and few limitations. *MRS Advances*, 2(33-34): 1769–84

Tykot, R.H. 2019. Geological Sources of Obsidian on Lipari and Artifact Production and Distribution in the Neolithic and Bronze Age Central Mediterranean. *Open Archaeology*, 5: 83–105.

Tykot, R.H., Lai, L. & Tozzi, C. 2011. Intra-Site Obsidian Subsource Patterns at Contraguda, Sardinia (Italy). In Turbanti-Memmi, I. (ed.), *Proceedings of the 37th International Symposium on Archaeometry, 13th-16th May 2008, Siena, Italy*, 321–8. Springer, Heidelberg & London

Tykot, R.H., Iovino, M.R. Martinelli, M.C. & Beyer, L. 2006. Ossidiana da Lipari: le fonti, la distribuzione, la tipologia e le tracce d'usura. *Atti del 39° Riunione Scientifica dell'Istituto Italiano di Preistoria e Protostoria: Materie prime e scambi nella preistoria italiana*, Firenze, 25-27 November 2004, 592–7. Florence

Van Gennep, A. 1960. *The Rites of Passage*. University of Chicago Press, Chicago [French original 1909]

Van Leusen, P.M, 2002. *Pattern to Process: Methodological Investigations into the Formation and Interpretation of Spatial Patterns in Archaeological Landscapes (PhD dissertation, Rijksuniversiteit, Netherlands).* http://dissertations.ub.rug.nl/faculties/arts/2002/p.m.van.leusen/, April 18, 2005

VanPool, C.S. & VanPool, T.L. 1999. The scientific nature of Postprocessualism. *American Antiquity,* 64: 33–54

Vita-Finzi, C. & Higgs, E.S. 1970. Prehistoric economy in the Mount Carmel area of Palestine: site catchment analysis. *Proceedings of the Prehistoric Society*, 36: 1–37

Volpe, G. 2006. Archeologia aerea, archeologia dei paesaggi e archeologia globale della Daunia. In Radcliffe, F.F. (ed.), *Paesaggi sepolti in Daunia. John Bradford e la ricerca archeologica dal cielo 1945/1957*: 13–36. Claudio Grenzi Editore, Foggia.

Volpe, G., Romano, A.V., & Goffredo, R. 2003. Archeologia dei paesaggi della valle del Celone. 23° *Convegno Nazionale sulla Preistoria–Protostoria–Storia della Daunia. San Severo 2002*: 367–91. Archeoclub, San Severo

Volpe, G., Romano, A.V., & Goffredo, R. 2004. Il 'Progetto Valle del Celone': ricognizioni, aerofotografia, GIS. In Buora, M. & Santoro, S. (eds), *Progetto Durrës. Atti del II e del III Incontro Scientifico, Antichità Altoadriatiche*, 58: 198–220. Udine

Wagner, H. (ed.) 1970. *Alfred Schutz on Phenomenology and Social Relations*. Heritage of Sociology Series, Chicago

Waller, S. J. 1993. Sound Reflection as an Explanation for the Content and Context of Rock Art. *Rock Art Research,* 10(2): 91–101

Waller, S. J. 2012. Acoustic Mapping of Rock Art Soundscapes. *American Indian Rock Art,* 38: 181–8

Warnier, J-P. 2001. A praxeological approach to subjectivation in a material world. *Journal of Material Culture*, 6(1): 5–24e: 186–96. Sage Publications, London

Warnier, J-P. 2006. Inside and outside: surfaces and containers. In Tilley, C., Keane, W., Küchler, S., Rowlands, M. & Spyer, P., (eds), Handbook of Material Culture: 186–96. Sage Publications, London

Watson, A. 2001. Composing Avebury. *World Archaeology*, 33(2): 296–314

Watson, A. 2005. Monuments that made the world: performing the henge. In Cleal, R. & Pollard, J. (eds), *Monuments and material culture: papers in honour of an Avebury archaeologist: Isobel Smith*: Hobnob Press, East Knoyle

Watson, A. & Keating 1999. Architecture and sound: an acoustic analysis of megalithic monuments in prehistoric Britain. *Antiquity,* 73: 325–36

Wattez, J. 1992. *Dynamique de formation des structures de combustion de la fin du Paléolithique au Néolithique Moyen. Approche méthodologiques et implications culturelles.* Paris

Wattez, J., Courty, M.A., & Macphail, R.I. 1990. Burnt organo-mineral deposits related to animal and human activities in prehistoric caves,. In Douglas, L.A. (ed.), *Soil Micromorphology: a Basic and Applied Science*: 431–9. Developments in Soil Science Volume 19. Elsevier, Amsterdam

Burbidge, C.I., Sanderson, D.C.W., Fu¨ lo¨ p, R., 2008, Luminescence Dating of Ditch and

Pitfills from Newry Ring Fort, Northern Ireland, SUERC, East Kilbride, 91pp.

Wheatley, D & Gillings, M, 2000. Vision, perception, and GIS: developing enriched approaches to the study of archaeological visibility. In Lock, G. (ed.), *Beyond the Map: Archaeology and Spatial Technologies*: 1–27. IOS Press, Amsterdam

Whitehouse, R.D. 1968. *Early Agricultural Communities in Southern Italy*. Unpublished PhD dissertation, University of Cambridge.

Whitehouse, R.D. 1969. The Neolithic pottery sequence of southern Italy. *Proceedings of the Prehistoric Society*, 35: 267–310

Whitehouse, R.D. 1984. Social organisation in the Neolithic of southeast Italy. In Waldren, W.H., Chapman, R., Lewthwaite, J. & Kennard, R-C. (eds), *The Deya conference of Prehistory. Early Settlement in the Western Mediterranean Islands and their Peripheral Areas*. part iv: 1109–37. BAR International series 229 (iv) Oxford

Whitehouse, RD, 1986. Siticulosa Apulia revisited. *Antiquity*, 60: 36–44

Whitehouse, R.D. 1992. *Underground Religion. Cult and Culture in Prehistoric Italy*. Accordia Research Centre, London.

Whitehouse, R.D. 1994a. The British Museum ^{14}C programme for Italian Prehistory. In Skeates, R. & Whitehouse, R. (eds), R*adiocarbon Dating and Italian Prehistiry*.: 85–98. Accordia Resarch Institue, London

Whitehouse, R.D. 1994b. Società ed economia nel neolitico italiano: la problematica dei fossati. In Tusa, S. (ed.), *La preistoria del basso Belice e della Sicilia meridionale nel quadro della preistoria siciliana e mediterranea*: 275–85. Società Siciliana per la Storia Patria & Istituto di Archeologia, Palermo

Whitehouse, R.D. 2001a. Exploring gender in prehistoric Italy. *Papers of the British School at Rome*, 69: 49–96

Whitehouse, R.D. 2001b. A Tale of Two Caves. The archaeology of religious experience in Mediterranean Europe. In Biehl, P. & Bertèmes, F. (eds), *The Archaeologies of Cult and Religion*: 161–7. Archaeolingua Foundation, Budapest

Whitehouse, R.D. 2002. Gender in the South Italian Neolithic: a combinatory approach. In Nelson, S. & Rosen-Ayalon, M. (eds), *In Pursuit of Gender. Worldwide Archaeological Approaches*: 15–42. AltaMira Press, Walnut Creek, CA

Whitehouse, R.D. 2005. Extraction and exchange of flint in Neolithic southeast Italy. In Attema, P., Nijboer, A. & Zifferero, A. (eds), *Papers in Italian Archaeology VI. Communities and Settlements from the Neolithic to the Early Medieval Period*. Vol II: 545–53. British Archaeological Reports International Series 1452, Oxford

Whitehouse, R.D, 2014. The chronology of the Neolithic ditched settlements of the Tavoliere and the Ofanto Valley. *Accordia Research Papers*, 13, 57–78

Whitehouse, R.D. 2016. Between symbol and senses: the role of darkness in ritual in prehistoric Italy. In Dowd, M. & Hensey, R. (eds), *The Archaeology of Darkness*: 25–37. Oxbow Books, Oxford & Philadelphia

Whitridge, P. 2015 The sound of contact: historic Inuit music making in northern Labrador. *North Atlantic Archaeology,* 4: 17–42

Whittle, A. 1996. *Europe in the Neolithic. The creation of new worlds*. Cambridge University Press, Cambridge

Whittle, A. 2000. New research on the Hungarian Early Neolithic. *Antiquity,* 74: 13–14

Whittle, A. 2003. *The Archaeology of People: Dimensions of Neolithic Life*. Routledge London & New York

Whittle, A. (ed.) 2007. T*he Early Neolithic on the Great Hungarian Plain: investigations of the Körös culture site of Ecsegfalva 23, Co. Békés*. Archaeological Institute of the Hungarian Academy of Sciences, Budapest

Whittle, A, Pollard, J. & Grigson, C. 1999. *The Harmony of Symbols: Windmill Hill Causewayed enclosure*. Oxbow, Oxford

Whittle, A, Pollard, J. & Grigson, C. 1999. *The Harmony of Symbols: Windmill Hill Causewayed enclosure*. Oxbow, Oxford

Winn, S.M. & Shimbaku, D.M 1980. *The Heritage of Two Subsistence Strategies: Preliminary Report on the Excavations at Grotta Scaloria, Southeastern Italy, 1978*. Occasional Papers I Anthropology, 9. Dept. of Anthropology, Saint Mary's University, Halifax, Nova Scotia

Witcher, RE, 1999. GIS and Landscapes of Perception. In Gillings, M., Mattingly, D. & van Dalen, J. (eds), *Geographical Information Systems and Landscape Archaeology, The Archaeology of Mediterranean Landscapes, volume 3:* 13–22. Oxbow Books, Oxford:

Wobst H. M. 1977. Stylistic behavior and information exchange. In Cleland, C. (ed.), *For the Director: Research Essays in Honor of James B. Griffen*: 317–42. Museum of Anthropology, University of Michigan, Ann Arbor MI

Wood, J, 1996. *The Geomorphological Characterisation of Digital Elevation Models* (PhD Thesis, University of Leicester). http://www.soi.city.ac.uk/~jwo/phd/, January 26, 2005

www.puglia.climatemps.com Foggia, Puglia Climate & Temperature. Accessed 15/08/2016

www.richardlong.org/Sculptures/2011sculptures/linewalking.html Richard Long: Sculptures, Textworks, Exhibitions, Drawings, Biography, About. Accessed 30/08/2016

www.sengpielaudio.com/calculator-distance.htm

www.theguardian.com › Environment › Travel and transport (accessed 12/08/2016)